



US Army Corps
of Engineers

Construction Engineering
Research Laboratory

USA-CERL SPECIAL REPORT N-86/23
September 1986

AD-A206 763

Matériel Readiness Support Activity Automation Plan

Appendix B: Survey Report

by
Calvin C. Corbin
Carol J. Molnar

DTIC
ELECTE
APR 10 1989
S H D

Approved for public release; distribution is unlimited.

89 4 07 122

The contents of this report are not to be used for advertising, publication or promotional purposes. Citation of trade names does not constitute an official indorsement or approval of the use of such commercial products. The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

**DESTROY THIS REPORT WHEN IT IS NO LONGER NEEDED
DO NOT RETURN IT TO THE ORIGINATOR**

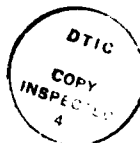
REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) USA-CERL SR N-86/23 APPENDIX B			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION U.S. Army Construction Engr Research Laboratory		6b. OFFICE SYMBOL (If applicable) CECER-EN	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) P.O. Box 4005 Champaign, IL 61820-1305			7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION Army Materiel Command		8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER Project Order No. MRSA 47-85, dated September 1985.		
8c. ADDRESS (City, State, and ZIP Code) Materiel Readiness Support Activity Lexington, KY 40511-5101			10. SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.
			WORK UNIT ACCESSION NO.		
11. TITLE (Include Security Classification) Materiel Readiness Support Activity Automation Plan (U)					
12. PERSONAL AUTHOR(S) Corbin, Calvin C. and Molnar, Carol J.					
13a. TYPE OF REPORT Final		13b. TIME COVERED FROM _____ TO _____		14. DATE OF REPORT (Year, Month, Day) 1986, September	
15. PAGE COUNT 232					
16. SUPPLEMENTARY NOTATION Copies are available from the National Technical Information Service Springfield, VA 22161					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP			
05	01		Army Materiel Command planning		
			Materiel Readiness Support Activity ,		
			automation - (JRS) ←		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
<p>↙</p> <p>A comprehensive survey was conducted of the Materiel Readiness Support Activity (MRSA) of the Army Materiel Command (AMC) to determine their uses of automated data processing technology. This survey (unattached Appendix B) was then used to project a long range plan addressing MRSA's data processing needs. The long range automation plan for MRSA is presented in this report. → page 2</p>					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL GLORIA WIENKE			22b. TELEPHONE (Include Area Code) (217)352-6511, ext. 353		22c. OFFICE SYMBOL CECER-IMT

CONTENTS

	Page
1 INTERVIEW INFORMATION.....	3
2 INFORMATION MANAGEMENT DIVISION.....	9
Introduction	
Summary of Future ADP Plans	
Description of Automated Systems	
Data Description	
Organizational Information	
Mail Room	
Flow Diagrams and Descriptions	
3 RESOURCE MANAGEMENT DIVISION.....	43
Summary of Future ADP Plans	
Description of Automated Systems	
Data Description	
Organizational Information	
Flow Diagrams and Descriptions	
Communication Mode and Destination Summaries	
4 MAINTENANCE DIVISION.....	58
Summary of Future ADP Plans	
Maintenance Division Contacts with IMD	
Description of Automated Systems	
Organizational Information	
Flow Diagram and Descriptions	
5 READINESS DIVISION.....	68
Summary of Future ADP Plans	
Description of Automated Systems	
Data Description	
Organizational Information	
Flow Diagrams and Descriptions	
6 SUPPLY DIVISION.....	83
Summary of Future ADP Plans	
Description of Automated Systems	
Data Description	
Organizational Information	
Flow Diagrams and Descriptions	



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

MATERIEL READINESS SUPPORT ACTIVITY AUTOMATION PLAN
APPENDIX B: SURVEY REPORT

1 INTERVIEW INFORMATION

→ The objective of the interview effort at MRSA was to assess and identify MRSA requirements for a long-range, mission oriented automation system, specifically in developing strategies for acquiring and successfully managing those systems, and in defining, evaluating, and recommending courses of action to satisfy the requirements. The approach of the interview effort was to:

- Identify the information data requirements, data sources, and their relationships *key words →*
- Identify the functional users and their data needs;
- Depict the work and information flow to other organizations and agencies;
- Identify MRSA information processing procedures and depict the lines of communications associated with systems development and use; and of particular importance;
- Identify future work requirements that will originate internally or through new external system implementations.

To accomplish the items identified above, it is necessary to understand MRSA and its internal organization, the suppliers of the data that create the MRSA data bases, and users of this data.

The Army is essentially composed of materiel developers, combat developers, and users. The Army Materiel Command (AMC) is the materiel developer. After the materiel is developed, AMC also becomes the supplier and the repository of the data generated by the development, use, and repair of the materiel (equipment). The Training and Doctrine Command (TRADOC) is the combat developer and as such, provides the requirements (user needs) to AMC for development of the equipment needed to carry out training and the mission of the Army. The user either provides information to the combat and materiel developers or makes use of the products developed or supplied. The frequency of interaction that is required among the user, TRADOC, and AMC implies the need for large amounts of data. Consequently, some organizations must maintain this data and establish sizable data bases requiring constant update and validation.

Within the Army Materiel Command, MRSA is the central repository of engineering, maintenance, and repair data for the materiel developer. MRSA links the data generated by materiel developers, combat developers, and field users and provides it to all elements of command throughout the Army. Figure B1 illustrates the flow of logistics data between MRSA and the other Army command elements.

MRSA

A DATA FOCAL POINT FOR THE ARMY

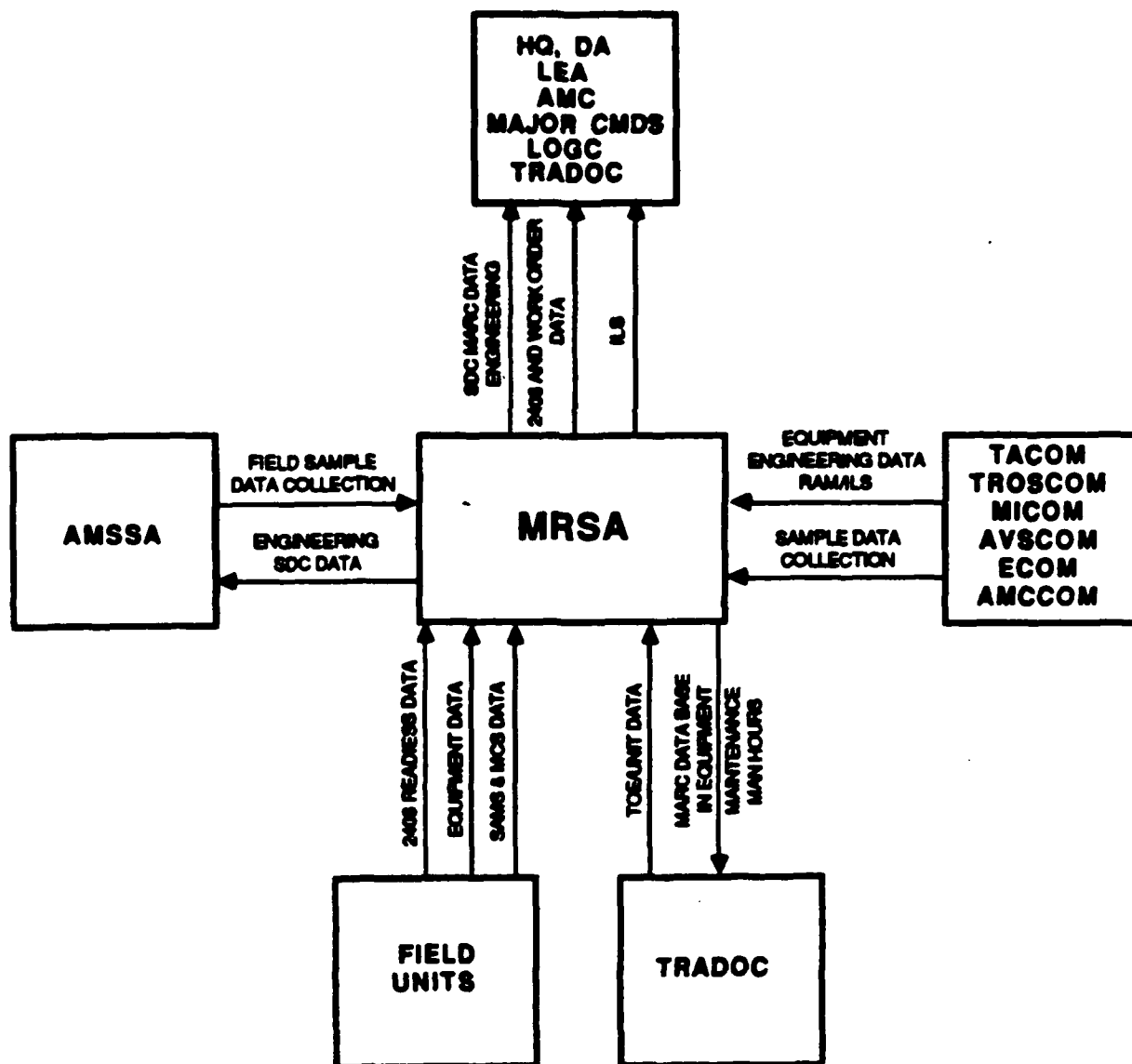


Figure B1. Relationship of MRSA to the Army.

MRSA is organized into five divisions: three functionally oriented divisions, a management information system division, and a programs and services division. The functional divisions are maintenance, readiness, and supply.

Some of the key systems and data bases maintained by MRSA include:

- Reliability and maintainability (RAM) and engineering data,
- Readiness data reported from field units (e.g., 2406 and unit readiness report data),
- Equipment maintenance data (e.g., work orders), reported from field units and information reported through the maintenance control system and through SAMS 1 and 2 as they are implemented,
- Sample data collection provided by the maintenance and engineering directorates of the National Inventory Control Points (NICP) by sampling items in field units in a semicontrolled environment,
- Manpower requirements criteria (MARC) maintenance man-hour data used by TRADOC to develop Tables of Organization and Equipment (TOEs),
- Data generated from AMC's Commodity Command Standard System (CCSS), and
- Special programs generated from Army data elements and units with corresponding data bases such as the Army and analysis program and the preventative maintenance (PM) magazine.

The RAM engineering data is obtained from the project managers through the research and development elements of the NICP, ERADCOM, MERDAC, and AMC laboratories and from Integrated Logistics Systems (ILS) managers throughout AMC. The data is used to initiate and maintain ILS support plans and to conduct manpower and logistics analysis studies for selected equipment. This RAM data, along with historical data generated by the CCSS system, enables the Army Management Systems Support Agency (AMSSA) to conduct provisioning and optimum repair level studies. RAM and Engineering data and the studies generated from the use of this data have an enormous impact on the fielding schedule of major Army weapons systems and on the budgets and funding requirements to support ILS programs and field maintenance repair policies.

The readiness data reported by Army field units provides MRSA the information necessary to perform analysis on the equipment deadlines and the reason/item causing the equipment to be nonoperational. The data also allows MRSA to analyze whether the readiness position of combat units is being affected by the failure of the supply system to provide the parts necessary to repair the equipment or whether the units have a maintenance problem (e.g., the lack of a special tool or the shortage of skilled resources to perform the task). In supply, MRSA can use CCSS on-hand-balance data to further isolate unit readiness supply issues. For example, if a specific repair part is causing a significant number of items to be deadlined and the CCSS systems shows on-hand-balances to be adequate, then the problem can normally be

defined as a procedural issue (e.g., requisition processing time in the unit is too long) or a transportation issue.

The equipment maintenance data reported from the field identifies ownership of the equipment by serial number and the length of time and resources required to repair the item by type of repair. This data is critical to updating the RAM and engineering data for several reasons. First, the initial engineering estimates are provided by the project manager and contractor whose primary function is to get a piece of equipment to the field within cost and schedule; therefore, data on failure rates of expensive equipment components are often underestimated. The project manager and contractor have little incentive to be concerned about operation and maintenance costs generated after an item is fielded. In addition, the field is not a test environment. The items and the rate at which they fail in the field can be different from those that fail under test conditions. Secondly, once items are fielded, they often undergo engineering change proposals and modification work orders that impact the mean-time-before-failure and mean-time-to-repair data.

Currently, MRSA receives field data in manual and automated forms. The manual data follows the procedures that have been established under TAMMS regulations in which MRSA is a major player. The automated data is generated from the standard automated Army systems and the maintenance control system (MCS). As SAMS I and SAMS II (the replacement systems for MCS) are fielded, they too will provide data input to MRSA maintenance and MARC data bases.

MRSA receives enormous amounts of data from field units. However, field reported data has historically been suspect. Because this data is suspect, the NICPs, in conjunction with MRSA, initiated a sample data collection (SDC) program. Under the SDC program, units and specific major items of equipment are selected for data collection under semicontrolled conditions. Once the SDC data is collected (by an independent contractor), it is evaluated by the NICP responsible for initiating the SDC program. After the data is validated, MRSA produces an SDC report and updates, with the approval of the NICP, the RAM and maintenance man-hours data bases used for TRADOC's MARC program. The MARC maintenance man-hours data is used by TRADOC to construct Tables of Organization and Equipment (TOEs). The TOE is constructed by military occupational specialty by type unit (organization Direct Support, General Support) and is used to structure Army units for wartime operations. The Army is undergoing a major modernization program which highlights the importance of keeping this data current.

The MARC data is also used by the Army staff to justify budgets and to conduct theater war games which ultimately provide the number of support units the Army can place in the force structure.

MRSA is also responsible for maintenance publication, structured assistance, and evaluation programs. Each program is critical to the Army maintenance and support mission. Two such programs are:

- The MRSA published PS Magazine, and
- MRSA's expansion of the oil analysis program from aircraft and tank engines to other equipment. This expansion will reduce unnecessary repair and/or identify equipment for shop work before a major

equipment failure occurs, thus saving operations and maintenance dollars in the long run.

MRSA has many challenges to look forward to in the next few years. A few of these challenges are identified below:

- Office Automation: Training personnel to use and rely upon the office automation computers will be a challenge. Since the Intel 310 is a standard Army purchase, the software problems should be minimal.
- Full and Open Competition: The new thrust in this area is for government agencies to procure brand x, y, and z machines. It will become increasingly more difficult to obtain plug-compatible hardware. Consequently, software designs must strive for transportability and intraoperability of systems.
- Controller of the Army (COA) Emphasis on Repair Costs: The COA review of NICP repair parts cost will eventually focus on RAM, LSAR, and SDC costs and will expect data to be structured to allow analyses among major items of equipment with similar component characteristics.
- Operational Readiness Float: Congressional focus on justifying operational readiness float will focus attention to the inaccuracies of data submitted by the field. Conversion to a new automated standard Army maintenance system will place additional burden on the accuracy of the work order data until the soldiers are trained on SAMS.
- Documentation Modernization: The vice chiefs' emphasis on immediate TOE documentation with incremental changes will focus attention on equipment maintenance man-hour inaccuracies in the TOEs with new replacement equipment.
- Army 21: TRADOC development of new fighting concepts and maintenance policy concepts will highlight the shortcomings of conventional engineering estimates developed by contractors for new equipment unless we educate the NICP and contractor engineers to use the equipment under the Army 21 concept.
- ULLS (Units Level Logistics System): ULLS will provide the motor pool with automation capabilities. MRSA must evaluate whether it will want to capture organization and support unit data and whether to capture the data by unit in the data bases.
- New DOD and AMC Initiatives: The initiatives include Computer Aided Logistics System (CALs), Modernization of Defense Logistics Standard Systems (MODELS), Electronic Data Interchange (EDI), Gateways, weapons systems management, Software Technology for Adaptive Reliable Systems (STARS), and TIMS. Most of these initiatives will impact on how MRSA does business today. For example, weapons systems management will require data to be stored by weapons systems with cross references to other weapons systems using the same components; the DDN and Gateway concept could generate many requests for MRSA data from all elements of the Army which could create a path for MRSA to become a national

data bank for shared information. These gateways will require more communications gear and different computer configurations.

- Technology is advancing by leaps and bounds with all Army elements moving toward more automation. If MRSA does not keep pace, it will be left behind and a new organization will assume the critical parts of MRSA's mission.

2 INFORMATION MANAGEMENT DIVISION

Introduction

The Information Management Division is the custodian of the mainframe computer systems. In their role as the keeper of the large MRSA data bases, as a central facility to all MRSA operations, Information Management Division endeavors to maintain a computing facility that will serve the needs of the MRSA system. Since the Information Management Division must meet many diverse demands from various divisions, it becomes the custodian of the large data sets required by the differing units within MRSA.

Intrinsic in its responsibility, IMD must provide a stable and effective working environment in which the data bases will reside. It must maintain an efficient and reliable system which is available to all who must have information gathered and stored in the course of the MRSA mission. IMD provides this service to MRSA through the AS/5 computer system coupled with various satellite systems.

Adjunct to the hardware responsibilities and no less important is the applications support group. This group is responsible for programming and maintaining a complex series of programmed systems that collect, verify, and maintain data and the data sets used for MRSA operations and MRSA's support of the larger AMC mission.

Summary of Future ADP Plans

This discussion includes all future plans indicated on the interviews within the IMD and incorporates by reference any plans indicated by the user division interviews that may have significant impact on the IMD computing resource. Where there are discrepancies, notations will be made.

Division Chief
Richard Cernek

The division is working on enhancing its mainframe computing system capacity by upgrading from one AS/5 mainframe of roughly the power of an IBM 370/158 to a second AS/5 mainframe. The current system suffers from severe overload. The second mainframe will be set up as an independent computer used primarily for testing and program development within IMD Systems and Applications Branch. The current system will continue to be used for production systems work.

The division is also interested in improving the telecommunications network capabilities both on the mainframe and satellite systems and intra-system. The result of this networking operation will permit the use of integrated distributed processing within MRSA, and is expected to result in much more productive use of all available resources. Mr. Cernek has plans for a new network that will incorporate most systems using the UNIX TCP/IP protocols.

Systems Design and Programming Branch
Carroll Tarvin

Ms. Tarvin indicates that when completed, the second AS/5 system will allow substantially better response to user unit requests. She would like to improve the performance of her programmers by providing them with more efficient programming tools and systems. She is concerned that the programmers cannot be productive due to the excessive job turnaround time on the AS/5 TSO/SPF system, currently averaging 30 minutes from the time a job is submitted until the programmer receives the results.

Ms. Tarvin would like to see dramatically increased disk storage on the AS/5. This improvement will allow the expansion of existing data sets and the addition of new systems. The current disk subsystem is overloaded. The concern is that there is insufficient space for existing systems, not considering new additions. She would like to see the disk system undergo a regularly scheduled maintenance curriculum. Currently she does not believe that regular maintenance, including VTOC reorganizations, compresses, and purges are done. This opinion is borne out by comments from Techniques and Operations Branches.

Ms. Tarvin would also like to see improvements in the computer resources available to the programming staff. The concern is that the branch cannot respond to functional users unless adequate resources to meet programmer needs are provided. She feels that better control over the allocation of the computing resource would result in improved service to the online users.

Ms. Tarvin would also like to see a change in the organization of the Design and Programming Branch. She would like a staff person who is knowledgeable in a broad spectrum of computing. This person would be skilled in the uses of personal computers, microcomputers, minicomputers and mainframes. This person would assist computer specialists in determining the appropriate role of the various computing hardware resources in the best solution to a data processing problem. Ms. Tarvin would like to do systems analysis and planning, incorporating knowledge about the potential of the various systems available to help her decide when to use the mainframe and when to use a distributed satellite system.

Ms. Tarvin would also like to see additional data base management systems investigated. These DBMS systems would be more user friendly and would, therefore make functional users more independent of the data center staff, thereby freeing programmer/analyst labor for more complex projects where their expertise is better used.

Hubert Manning

Mr. Manning would like to see a better use of the data base system. He feels that the Intel System 2000 is not a very efficient data base manager and since the system is severely overloaded, its use should be minimized until adequate resources can be brought online.

Lewis Hart

Mr. Hart would like to see more intrabranh discussion of the various system proposals. He feels that by having more intraunit discussion and more collaboration with the various branches, less data set redundancy and more efficient data organization will occur within the data bases. Since many units within MRSA use the same data for different purposes, discussion by the analysts within the sections of Systems Design and Programming Branch coupled with collaboration within the various units of MRSA will enable more efficient use of the scarce mainframe data base resources and will allow more integrated systems to be built using more reliable data. Mr. Hart provided an example of a potential integration of a data base from information used by the various divisions.

Techniques Branch
Ronald Ware

Mr. Ware indicated that he does not see any particular future trends that would directly affect the way the Techniques Branch operates.

R. Wantanan

Mr. Wantanan believes that a supercomputer will eventually be procured largely due to the pressure from the Readiness Division. He also feels that building the intersystem network will become increasingly important since more demand for mainframe data will be made by users of distributed satellite systems maintained by the users. He also feels that electronic mail will result in more demand on network products.

Computer Management Branch
Stanley Jones

Mr. Jones sees the need to modernize the hardware. He sees the second AS/5 system as a great help in relieving the overload on the existing system. He is also excited about the newer Hewlett Packard machines. He sees much more flexible scheduling of machines since one machine will be available for processing classified work while the other remains online.

Mr. Jones would like to see a more fully automated production job scheduling system. He would also like to see a more fully automated tape management system for cataloging and tracking magnetic tape input and output produced by the system.

Visual Arts Branch
Van Hoose, Henderson, Redman

This group would like improved computer access. Currently, raster graphics images used in the production of visual arts materials that rely on mainframe data must be exchanged over very low speed (300 bps) data lines. This results in unacceptably slow data transfer. This should be improved.

They would like the phototypesetter connected to the mainframe, since much of the material they produce is stored on the mainframe as portions of technical documents.

They identified a need for an additional multicolor printer because of the heavy workload, and as for backup to the current printer.

They would also like to be cross-trained on the Tektronix system so that all could use the system effectively.

Information Resources Management Branch
Larry Moore

Future trends visualized by Mr. Moore include a networked central laser printing shop for MRSA and a laser scanner for micrographics management. He would like microfiche, microfilm, and microforms of old records to be retrievable online. He also feels it is important to acquire a laser copier.

The area of Vital Records was also addressed. The need exists for a "Continuity of Operations Plan" with an alternate storage site and a "buddy system" that runs concurrently with MRSA and is capable of continuing operations in the event of an emergency at MRSA.

Two areas of electronic mail are being considered. One is a large electronic mailbox concept and the other is a restricted "official" network. It is anticipated that this will replace the current DFs.

Mr. Moore also sees a need to keep an updated index of all MRSA files with total duplicate files stored on tape offsite for continuation of MRSA operation in the event of emergency or disaster.

An improvement in the furniture and the physical MRSA work environment is anticipated.

Ralph Mitchell

Mr. Mitchell expressed a strong desire for a long range plan to guide operations in the future. He emphasized the need for a standard operating system across the board with complete plug compatibility between all equipment. He added that he would rather not see dedicated equipment used only by specific branches.

Mr. Mitchell views MRSA as a "production shop"--data in, report out. He would like individual workstations to be networked.

He expressed the need to upgrade the current MRSA phone system. The last upgrade was in the 1940's.

Bobby McNatt

Mr. McNatt reported one secure data base (RIDB) at MRSA that currently resides on the IMD HP3000. One encrypted site is AMC headquarters and nine additional sites will be coming online by September, 1986. The AS 5/3 system

was reportedly used for classified purposes 4 to 6 hours each day. A need for security software against local area networks was noted.

Description of Automated Systems

Introduction

Since the Information Management Branch is the "custodian" of the automated systems, this discussion is primarily oriented toward the systems they use in the course of internal operations. These systems include tools used in performing their mission to support applications required both within the division and systems required by other divisions.

Chief

Currently, Mr. Cernek's secretary uses a WYSE PC for general word processing.

Systems Design and Programming Branch

The Systems Design and Programming Branch is a heavy user of automated systems. Almost all employees in the branch must use the computer to create and modify programs and systems.

The primary automated tools in use by the programmers are the IBM Corp. utilities, TSO/SPF, ADR LIBRARYN, COBOL and FORTRAN compilers, PLEX extended programming language tool, JES2 job entry subsystem, and other miscellaneous programming products. In addition, a data base manager supplied by INTEL corporation, System 2000 (S2K) is used to develop data bases for the application groups.

The group also makes limited use of CICS in developing online systems. Currently, most of the online systems are developed around the S2K data base system.

The most significant problems reported with the use of TSO/SPF as a programming development facility within IMD is the poor response time of the system. It is not unusual for programmers to wait up to 30 minutes for a response from the computer. The exact causes of this problem are not known. Ms. Tarvin questions whether the systems programming group are familiar enough about OS/VSI tuning and optimizing techniques or if the equipment is powerful enough to do the job. She believes that the second AS/5 system will shorten response times and thus improve not only the efficiency of programming productivity, but the overall ability to respond to requests from other divisions for programming projects.

Ms. Tarvin would like to use other programming systems to develop programs for the AS/5 system, but does not believe that the INTEL 310 or the PC systems can be used for programming tasks since the bottlenecks are not in the editing of files, but rather the processing of compiles and tests. Since this is an integral component of programming, she feels that the programming and testing must take place on the mainframe system, due to the peculiar nature of

the system services and data base system, which are not available on the smaller systems.

Systems Design and Applications also has PC systems available for use in-house. The general feeling concerning the PCs is similar to that of the INTEL 310 system; they are not extremely useful for developing programs to run on the mainframe since they are not capable of using the higher level system calls and there is a communications problem between the systems.

Techniques Branch

The Techniques Branch supports operating hardware and software on the mainframe systems to provide an environment in which the applications programmers and functional users must do their work. As such, the Techniques Branch should be using automated systems to develop techniques and technologies to provide a stable and efficient automated data processing environment. The tools that this branch uses to perform this service include the SMF utilities provided by IBM, FDR, and other file management utilities; many of the same tools that the Systems Design and Programming Branch uses in performing its function.

It was unclear from the interviewees whether the branch uses disk analysis utilities on a regular basis to determine the state of the disk volumes in use. However, the branch does not perform disk maintenance on a regular basis. Such maintenance would generally include reorganization of the VTOC and compression of fragmented disk files.

Techniques is also involved in installing the INTEL 310 and PLEXUS UNIX based systems. The general feeling was that these systems would be used for interoffice electronic mail and word processing.

Computer Management Branch

Other than the normal operations programs provided by IBM corporation as part of the OS/VS1 system, no other automated systems are used by the Computer Management Branch. Production schedules are tracked manually. Tapes are cataloged manually.

Visual Arts Branch

Currently, the Visual Arts Branch has some significant systems. The systems currently in use are a Tektronix Graphical Arts package with sophisticated TV video digitizing capabilities and color hardcopy output units for producing both slides and prints. The branch also has a color printer capable of producing high quality color graphics.

Visual Arts also uses computerized phototypesetting equipment to generate camera ready documents for publishers.

Information Resources Management Branch

This branch is beginning to use Wyse PCs with dBase and Wordstar to automate office functions.

Data Description

Introduction

Since the Information Management Division is the primary custodian of data collected and processed by other units, this discussion will be somewhat more restricted than for end user data descriptions. The emphasis will be on data used to accomplish the IMD mission within MRSA.

Division Chief

A Wyse PC is available for word processing, spreadsheet, and dBase use. Electronic office automation is planned but not yet implemented using the INTEL 310 system.

Information is received from the various "intelligence sources," including but not limited to AMC sources, and division chiefs. This information is then collected to provide input to budgeting and strategic planning.

Systems Design and Programming Branch

According to Ms. Tarvin and Mr. Manning, the branch plans to implement a word processing system and an interoffice electronic mail system.

Techniques Branch

An Inventory system is maintained on the Wyse PCs to determine the location, ownership, and software specifications of the system. This system is maintained by Ms. Greer of the Techniques Branch and is based on physical inventory and physical location reports from individuals.

Computer Management Branch

Stanley Jones, Acting Chief of the Computer Management Branch indicates that the branch does not use substantially automated systems in meeting the branch's obligations. The branch does use the standard IBM OS/VS1 reports to determine the outcome of a given process on the computer.

Visual Arts Branch

Due to the special nature of the function of Visual Arts, the automated data used in the mission of the branch cannot be described by conventional methods. Essentially, this branch uses the computer to generate graphical data. Therefore, based on the drawings and information contained in a specific work order, the Visual Arts Branch will generate graphical art to meet the requirements.

The phototypesetting input comes from several sources. The document data is often supplied with the originating work order. Information from the TAMMS data base is sometimes used in the production of equipment manuals.

Information Resources Management Branch

Software for data base management, word processing, and spreadsheet functions are available for use on Wyse PCs in this branch. The MRSA Suspense System is to be networked for secretarial use in the future.

Organizational Information

The prescribed mission of the Information Management Division is to provide comprehensive management information systems development of computer applications pertinent to the mission of MRSA. IMD is further charged with the technical management of national level data bases that support the mission of MRSA and the AMC.

The IMD group appears to have less organizational rigidity within its structure. Many of its communication channels, both within the organization and interdivisionally are fluid.

A significant deviation from the prescribed mission of the division is the fact that they are not responsible for some of the satellite systems used. The HP 3000 system owned by the Readiness Division is a prime example. The system is managed and controlled by Readiness for their own purposes.

A second significant deviation from the Organization and Functions Document is the Techniques Branch's involvement in setting up programming of microcomputer systems, and the training microcomputer users. These additional responsibilities have been assumed by the Techniques branch without significant additional support personnel.

Mail Room

The mail room is a branch within IMD, although it is loosely connected. The mailroom serves the entire MRSA organization. The mailroom generates few outgoing communications and primarily receives inquiries related to mail handling. Plans for networking and micro-utilization for the MRSA Suspense System is being prepared.

Flow Diagrams and Descriptions

Caution should be exercised when drawing inferences from the flow diagrams in this section based on the named information/work/communication flows. The flows have been aggregated to avoid the problem of inferring from limited cases and data cases have been verified according to information provided through interviews and/or official MRSA documentation.

Exercise caution also when inferring flow volumes based on noted information/work/communication flows. A large number of different types of flows does not necessarily imply a heavy volume. Finally, in interpreting the information gathered from the "Communications" tables, please be aware that responses were made on varying respondent interpretations of the information being sought.

It is beneficial to cross-check the diagrams for one division with those for all other divisions.

IMD Contacts With Other Divisions For System Development

This section describes the contact points with functional users from the perspective of IMD. (See Figure B2.)

Chief. The IMD chief meets weekly with the division chiefs and Colonel Treadway in MRSA staff meetings.

There is an additional meeting with division chiefs to discuss information systems development and to set priorities on various divisional projects for IMD.

Systems Design and Programming Branch. Members of this branch meet with the functional user points of contact for the systems that they are involved in developing or maintaining. Currently, the bulk of the central data processing group efforts are directed toward maintaining and enhancing existing systems.

Once a project is initiated via a written work request, a computer specialist within the Systems Design and Programming Branch coordinates with the requesting section representatives. During the development phase, discussions take place between these groups until the project is completed.

It should be noted that little cross-sectional discussion within the branch occurs when new systems are developed. This creates the potential situation for duplication of data elements, loss of potential sharing of data resources among division projects and extra effort required in the overall data processing process.

Techniques Branch. The Techniques Branch receives written requests for projects, hardware and software from division chiefs. These requests are prioritized by Mr. Ware and assigned labor as staffing becomes available. Project priority is assigned in view of existing commitments and the amount of labor available. Conflicts are referred to Mr. Cernek and the division chiefs for resolution.

Mr. Ware gave no indication that any followup reports were made. Note: Most of the contacts are made on verbal requests, with little formalized initiation, progress reporting, or followup.

Operations Branch. The Operations Branch has little contact with users outside of IMD. Most of the work is directed through Mr. Cernek and the branch chiefs in a daily scheduling meeting. The branch receives direct supervision from Mr. Cernek.

Information Management Systems Groups Dependency Table

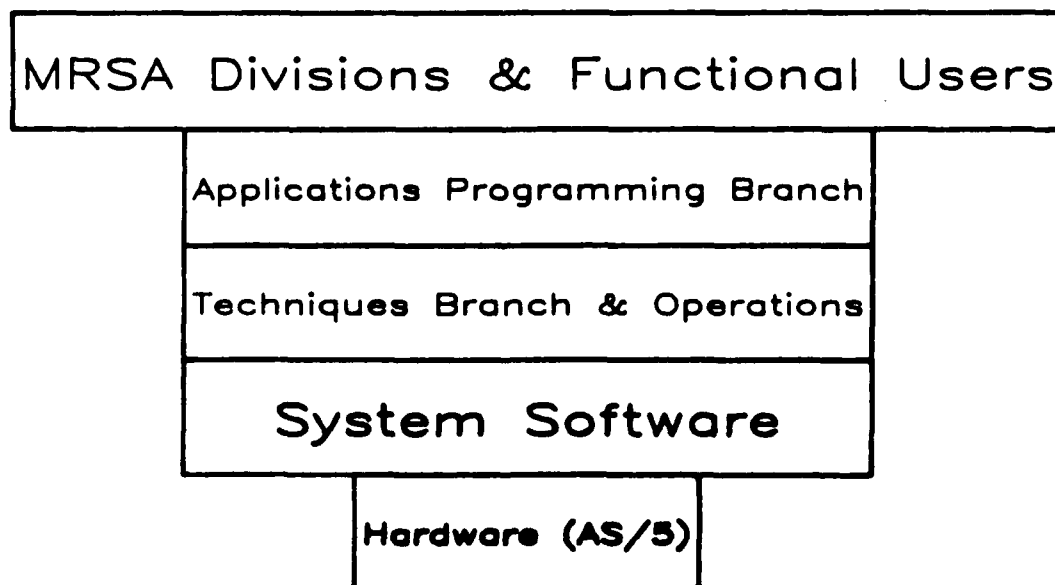


Figure B2. Information Management Systems Groups Dependency Table.

Visual Arts. This branch has the most formalized and procedurally oriented communications with other division officers. The Visual Arts Branch receives work orders for project initiation, develops a bill of materials and related requisitions, initiates discussions with requestors to clarify project requests, signs off projects, and requests followup reports on performance. Contacts are with division functional personnel both within MRSA and AMC. Occasionally they are contracted through AMC do to work for other Army units.

Information Resources Management Branch. Contact with other divisions appears to be fairly significant due to acquisition requests. Verbal contact was most prevalent.

Flows with MRSA Co and Deputy.

Information flowing from IMD to MRSA Co: Reports of activities, budget requests, organizational studies, and informal discussions concerning operations.

Flows With All MRSA Divisions

This flow is defined as contacts that occur between IMD and all other MRSA divisions for normal administrative purposes. Information flowing to all MRSA divisions includes: weekly staff meetings concerning project status and approval and prioritization, formal 30 correspondence concerning the daily operations of the systems, and general administrative correspondence.

Information flowing to IMD includes: General requests for IMD services, including requests for applications programming, systems programming, hardware support, microcomputer support, requests for computer acquisitions, contract information, requests for visual arts and graphics, and requests for general computer support.

Information flowing from IMD to the divisions includes: reports of daily activities, reports of data processing job schedules for the day, informal information on the ongoing work, results of requests for general computer support, contract information, automation plans and ideas, and acquisition of additional hardware.

Flows Within Information Management Division (IMD)

Much of the information flow within the branches of IMD appears to be informal and to flow verbally between interested parties of different branches. Generally, most administrative information passes through the division chief. There is a formal meeting of the branch chiefs each morning to discuss the daily schedule for operations and any other matters. Most service requests for IMD are submitted through the division chief, prioritized, and forwarded to the branches.

Communication Mode and Destination Summaries

It is difficult to make inferences on the mode of communication that passes the most information due to the fact that distribution of a written memo/DF and other variables are not known. We can more accurately infer how much time is spent preparing or engaging in each mode of communication. We assume the heading "verbal" to mean "in person."

Division Chief. Communication is evenly split within the division and outside the division. Most of Mr. Cernak's time is spent engaging in verbal communication (either in person or via phone). Frequently, the communications are very informal.

Communications within branch are generally very informal. Most communications are on an ad hoc basis, as the need arises. Formal meetings are held each morning to determine the operations schedule for the day.

Techniques Branch. Techniques branch has mainly verbal communications with Cernak, the branch chiefs and other branch action officers and support staff. Ron Ware talks with many branch personnel.

Ron Ware

Some written correspondence exists within the division, but most written correspondence is outside of the division and MRSA; the bulk of outside written correspondence being with vendors.

A formal verbal channel exists with Systems and Applications branch through Hubert Manning, the liason officer with the Systems and Applications Branch.

There is, at present, no electronic correspondence.

Robert Wantanen

Most communications are within the section. Communications are mainly verbal, the bulk in face to face contact. Communications outside of the branch are split between verbal and telephone discussions. Very little written correspondence occurs within MRSA.

Written correspondence and telephone contact occurs moderately frequently with outside suppliers and vendors. There is presently no electronic correspondence.

Sherry Greer

Her heaviest mode of communication is verbal. The heaviest destination of communication is out of her division and MRSA. Communication is split between lecture/laboratory contact, personal contact, and telephone contact. There is presently no electronic correspondence.

Systems Design and Programming Branch. This branch is heavily dependant on communications with other branches. Since the bulk of its project load is user driven, extensive contact is maintained with the user groups ("functional users") within the MRSA branches. Communications tend to be very narrow in scope, with section personnel concentrating nearly exclusively on the system within the domain. There is little informal cross section communications and no formal mechanism for cross sectional communications.

Carol Tarvin

Much of her communications are verbal and informal to her section chiefs. She also talks with Hubert Manning. Hubert Manning is a liason to the Techniques branch. There is much written correspondence with the division chiefs and functional users concerning the development of systems. Significant portions of this contact is verbal, by telephone, and by memo. There is presently no electronic correspondence.

Hubert Manning

Most of his communications are outside between Systems and Applications and Techniques branch in verbal form.

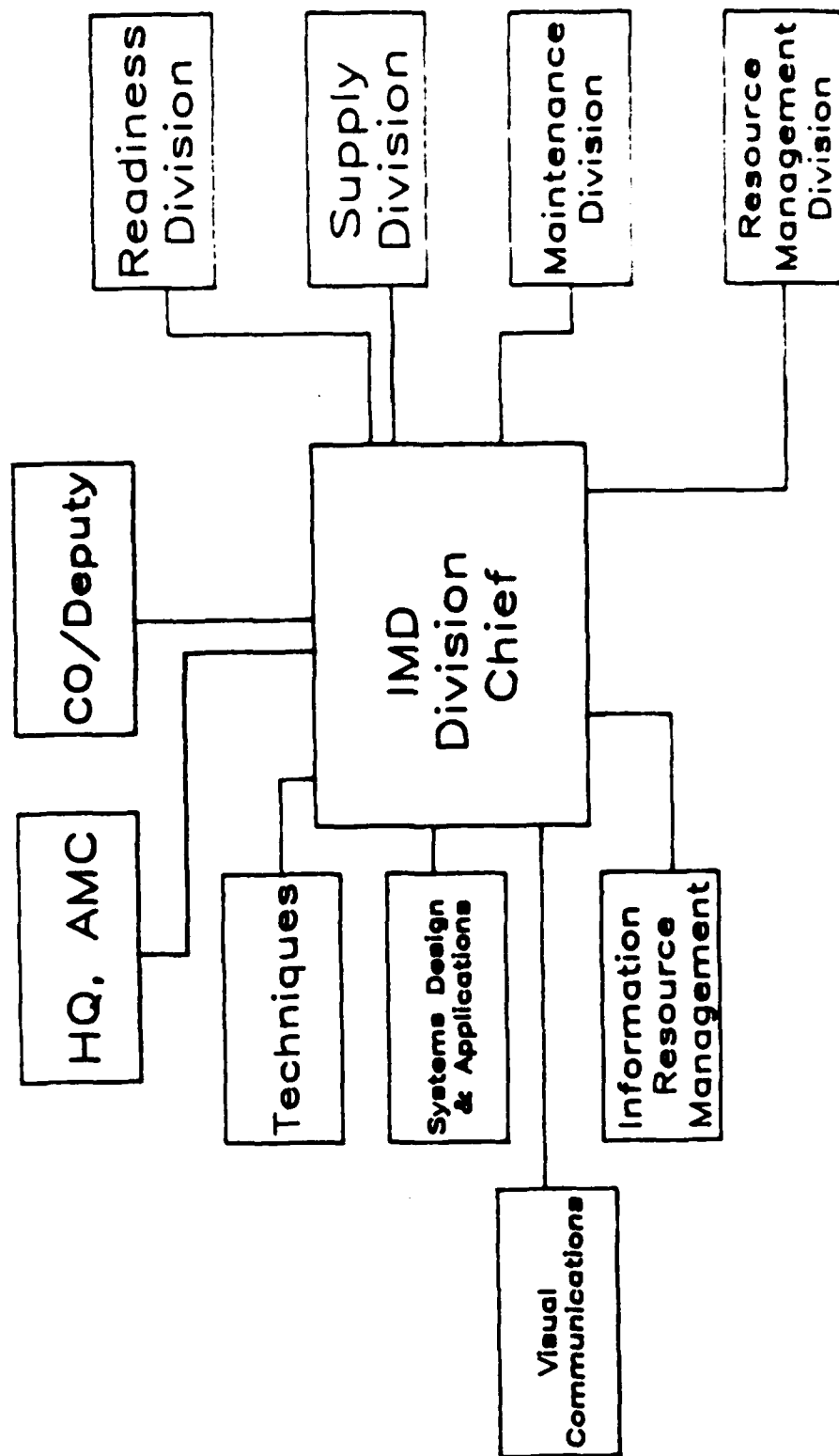
Lewis Hart

Most of his communications are informal with Carol Tarvin and Hubert Manning. He also speaks formally either in person or by telephone to functional users within the Supply and Equipment Divisions. Significant amounts of written correspondence is generated in the course of system development within the Supply and Equipment divisions.

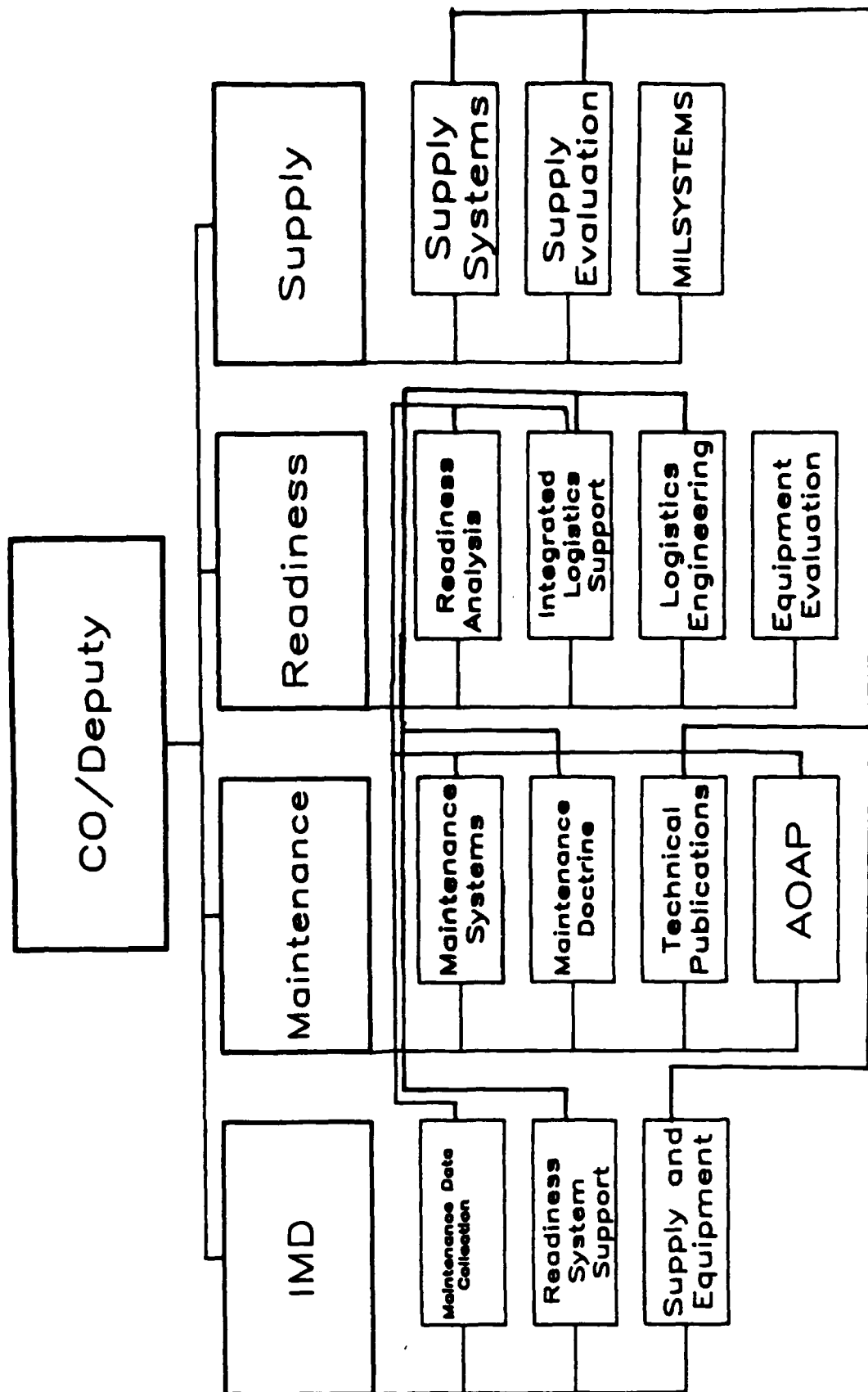
Computer Management Branch. Most of Stanley Jones's communications are within the division, and are a combination of verbal and written correspondence. Formal written correspondence is the daily operations schedule developed at the morning operations schedule session with the branch chiefs.

Additional telephone correspondence with vendors for hardware problem resolution occurs. This contact is primarily to ~~summon~~ service technicians to repair equipment. There is at presently no electronic correspondence.

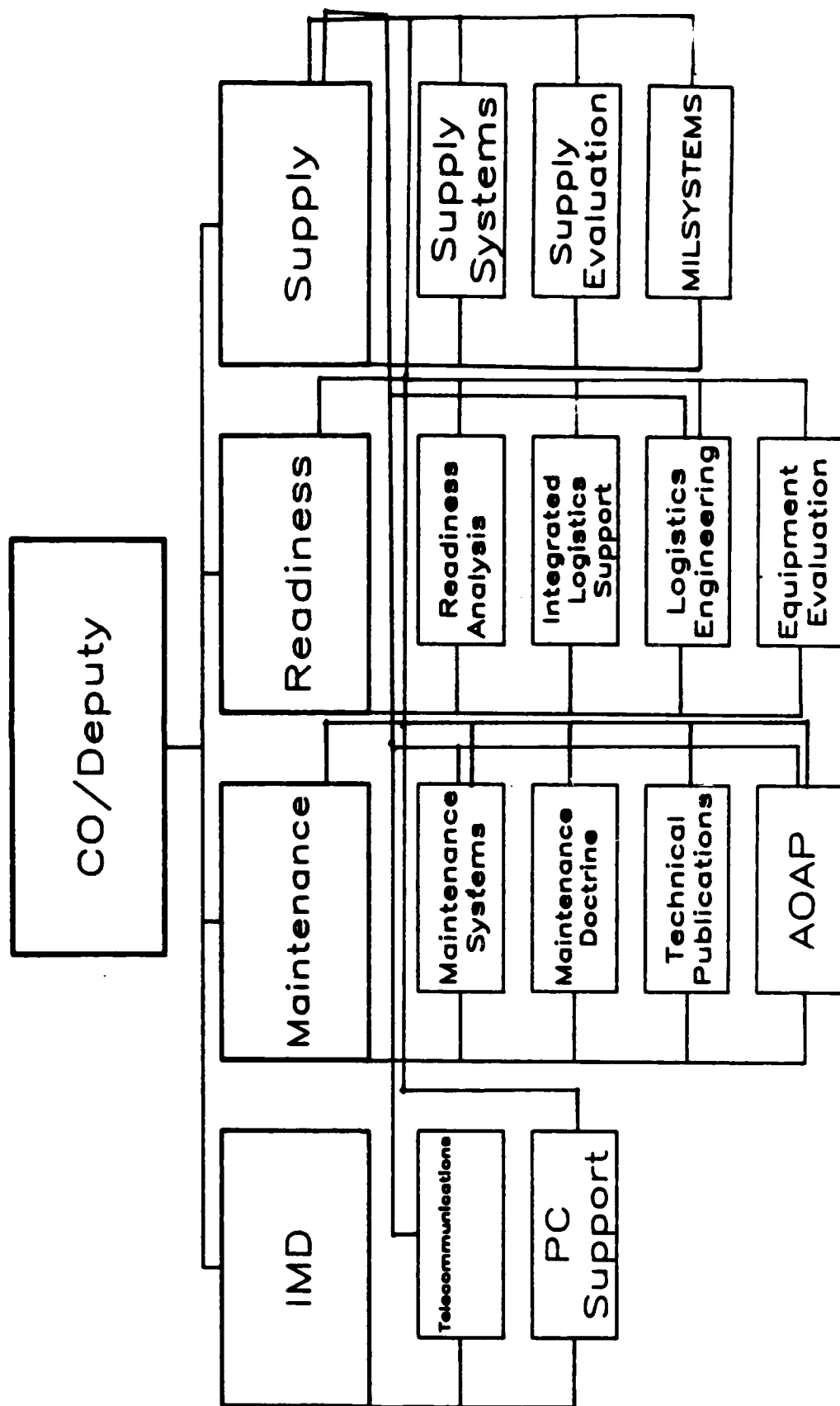
Visual Communications Branch. The bulk of the communications are formal, well defined written work orders from other divisions within MRSA, from within the IMD division, and from AMC. Occasional contact by telephone with requestors is required to clarify requested work. There is presently no electronic correspondence.



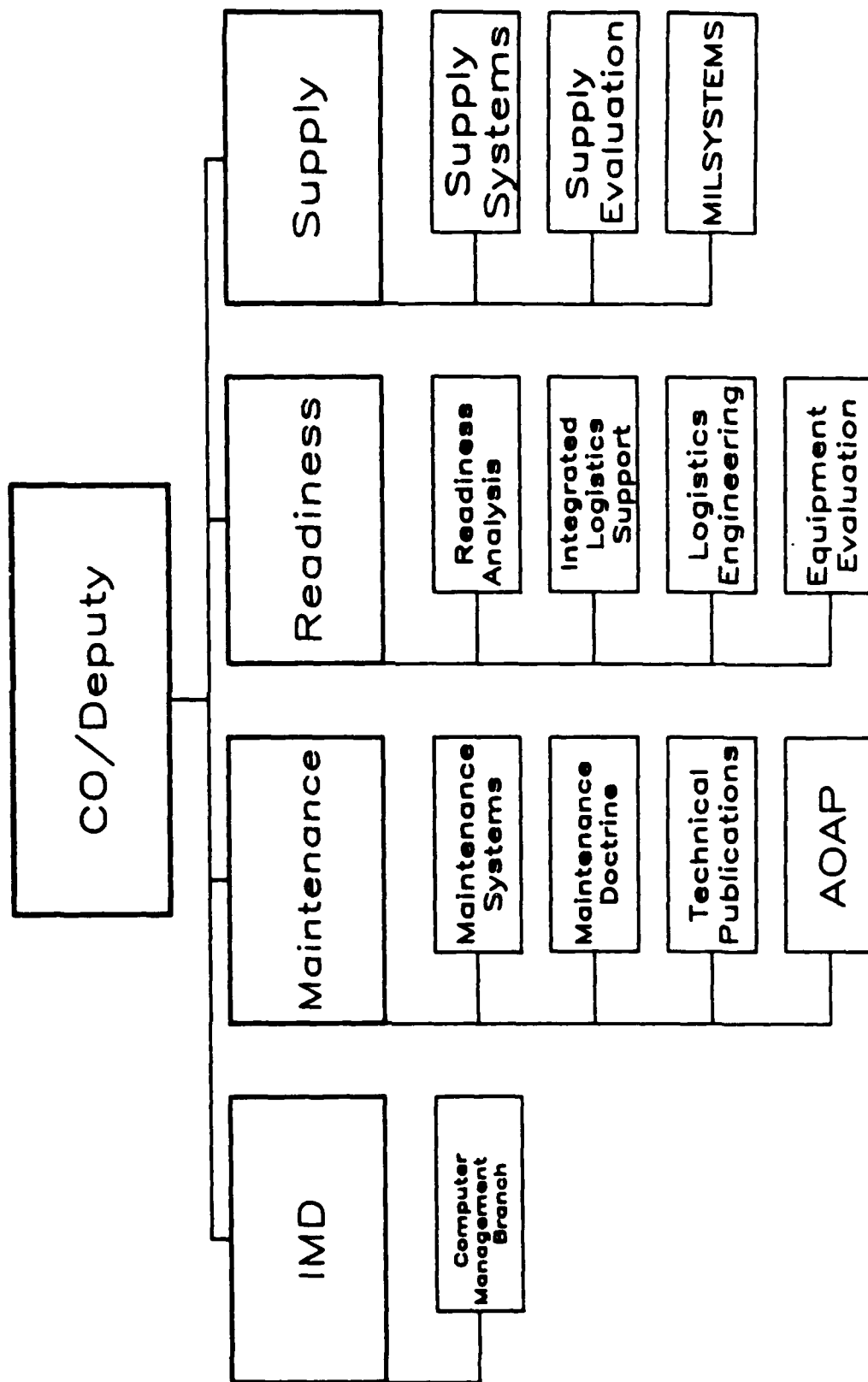
IMD COMMUNICATIONS SYSTEMS DESIGN AND APPLICATIONS BRANCH



IMD COMMUNICATIONS TECHNIQUES BRANCH

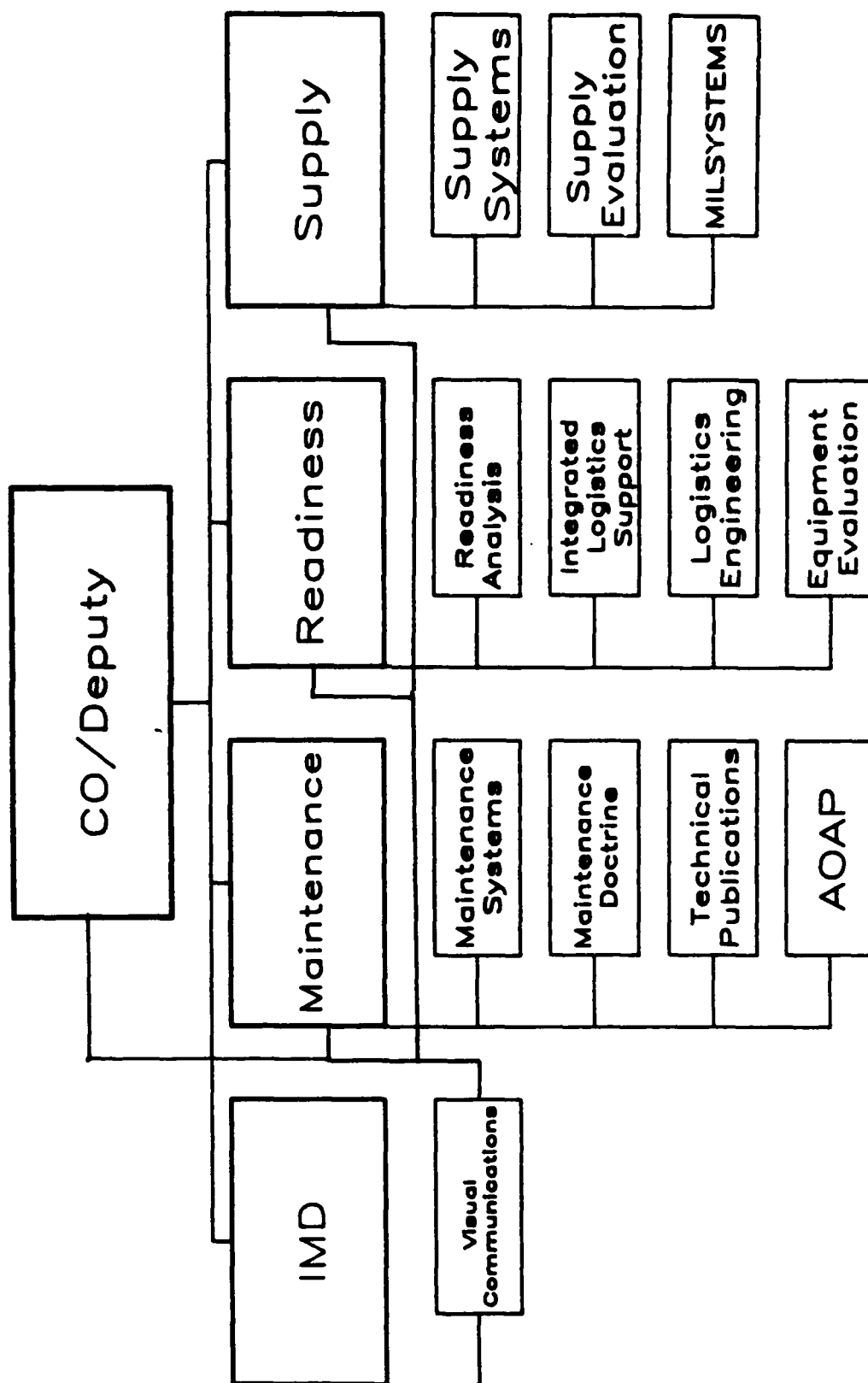


IMD COMMUNICATIONS COMPUTER MANAGEMENT BRANCH



There were no clearly described contacts with other divisions

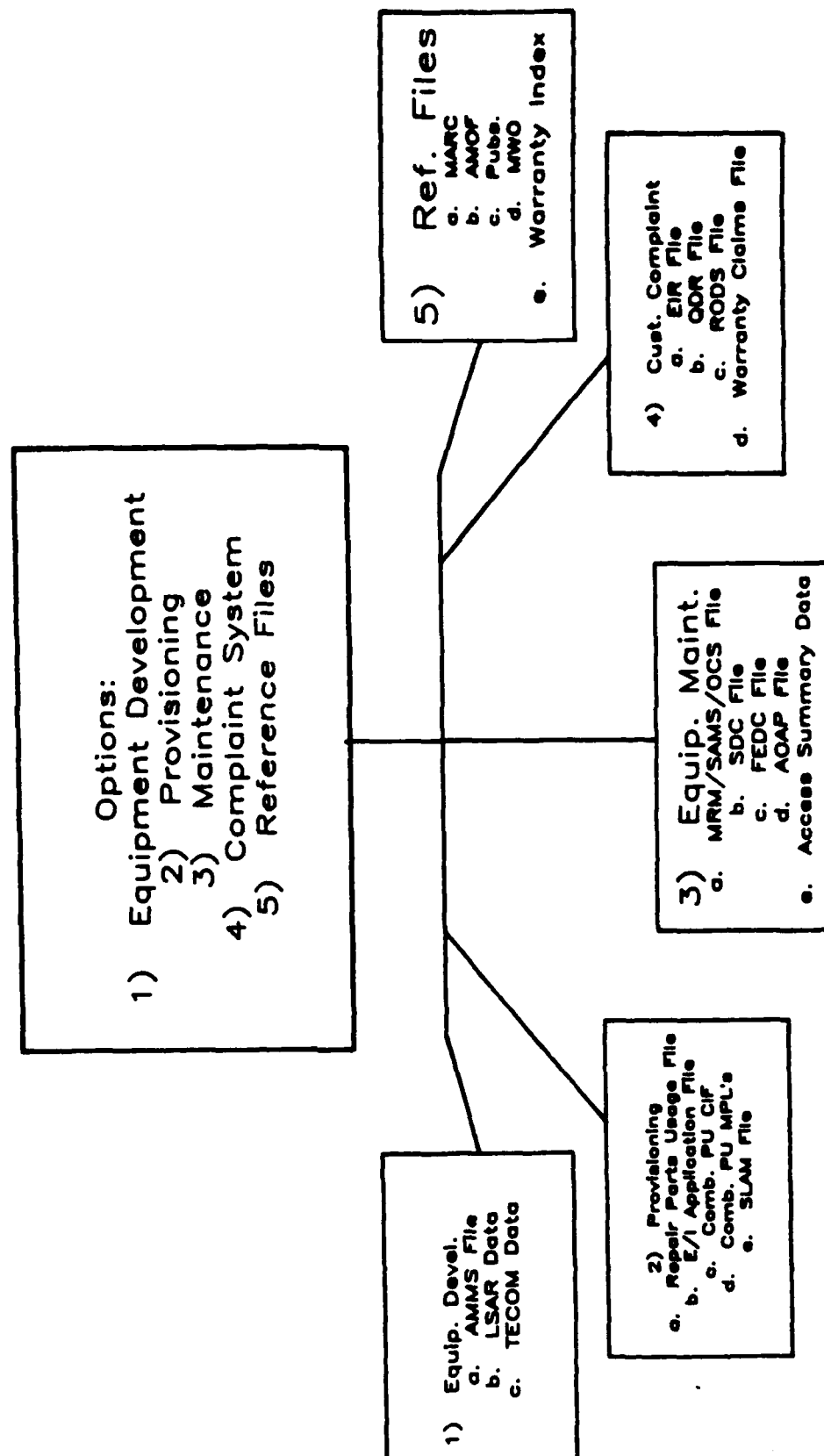
IMD COMMUNICATIONS VISUAL ARTS BRANCH



*Requests from AMC for services are channeled through MRSA

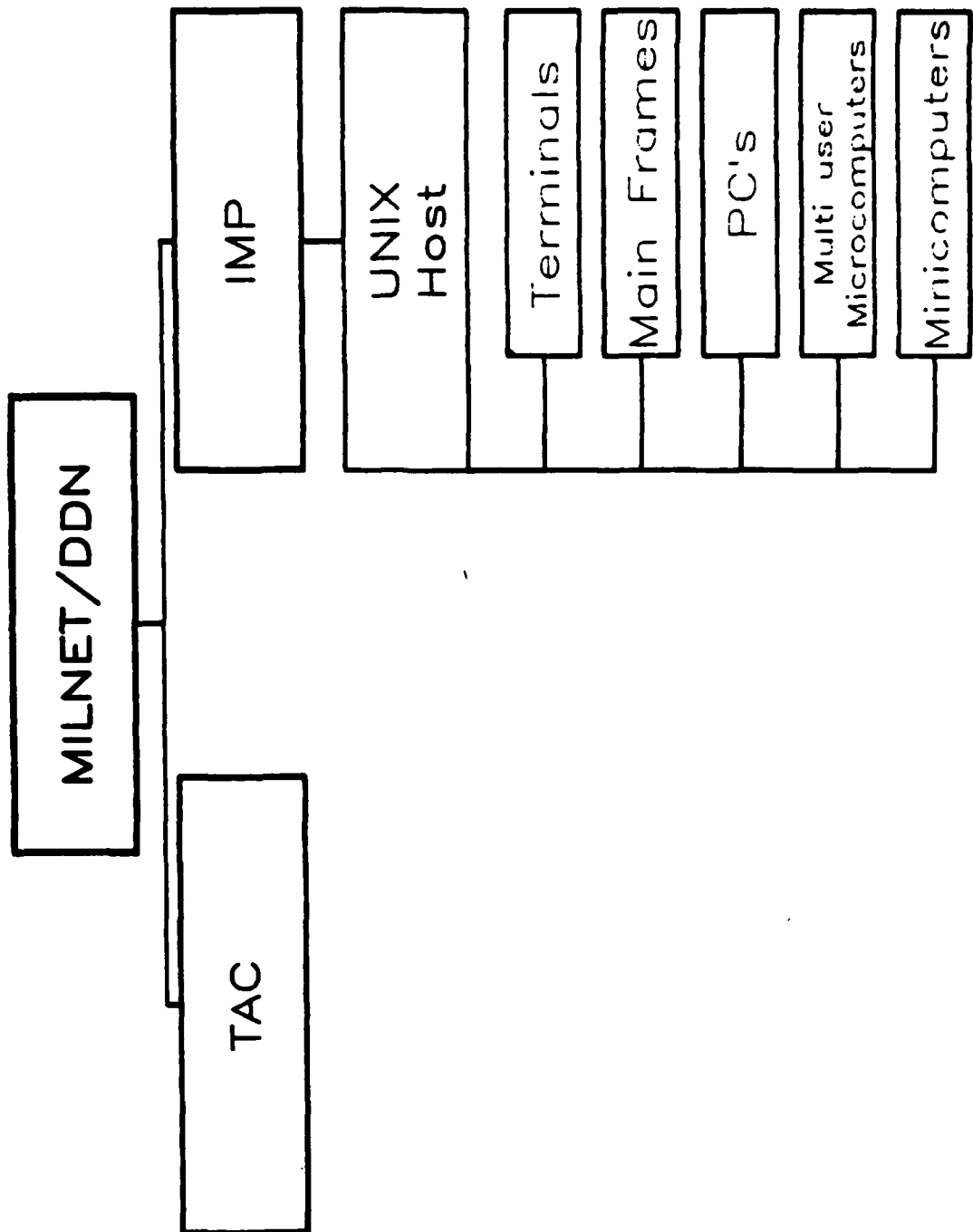
Integrated MRSA Database Design Proposal

By L. Hart, Section Chief
Equipment and Supply Section



MRSA Proposed Data Communications Network

By R. Cernak, Division Chief



Bay C

1. Resource Management Branch
Ralph Mitchell
2 Wyse machines
Used primarily for office automation
All Wyse are basically for office automation - Linked to 310 in
C. Hisel's office

Bay C

2. Management Information Systems Division Chief
Richard Cernek
1 Wyse machine linked to 310 in Carroll Tarvin's office
1 Xerox typewriter - stand alone

Bay C

3. Maintenance Division
Gayle Rees
No machines yet, but Plexus is to be brought in

Bay C

4. Supply and Equipment Support Systems
Lewis Hart
 - A. Memorex 2078
 - B. IBM 3278-4
 - C. IBM 3278-4
 - D. IBM 3278-5All hooked to the AS/5

1 Wyse machine, independent, hooked into the 310 thru Carroll Tarvin's Section

Machines used primarily for Office Automation and documentation

Bay C

5. Information Resources Branch
Lou Connelly
 - A. Memorex
 - B. IBM 3278-4 (possible Memorex)
 - C. IBM 3278-4
 - D. IBM 3278-5
 - E. All hooked to the AS/5
 - F. IBM 3278-4

Bay C

6. System's and Programming Branch
Carroll Tarvin (3 Sections)
 - A. 1 Wyse (Nathan)
 - B. 1 Wyse (Secretary) 310 all
 - C. 1 Wyse

D. 1 Wyse
Used for Office Automation and documentation

Bay C

7. Carroll Tarvin's Office
A. Wyse PC
B. Wyse PC
Hooked to the 310 in her area
Used for Office Automation and documentation

Bay C

8. Maintenance Data Collecting Section (Systems Branch)
Carl Webb
A. IBM 3278-4 hooked thru the AS/5
B. Wang - hooked into Wang in Computer Room
C. Wang - hooked into Wang in Computer Room
D. IBM - hooked thru the AS/5
E. Memorex 2078 - hooked thru the AS/5
F. IBM - hooked thru the AS/5
G. Wyse - hooked thru Carroll Tarvin's 301 (in Section 6)
Used for Oil Analysis Program

Bay C

- 9 Computer Management Branch (Information Services Section)
Charles Hisle
A. IBM 3278 - hooked to AS/5
B. Memorex 2978 - hooked to AS/5
C. Wyse - hooked to 320 in this area
D. Wyse - hooked to 320 in this area
E. Wyse - hooked to 320 in this area

Wyse's used for Office Automation; other used for program updates, 132 Inventory Reports, etc.

Bay A

10. Visual Communication Branch
A. Wyse - Stand alone - Office Automation
B. Tektronix - graphics - not yet hooked to AS/5
C. Posters, charts, etc.
D. Tektronics 4051A
E. Tektronics 4051A
F. Tektronics 4051A
G. Tektronics 4051A
H. Tektronics 4115B and 46911 jet printer - hooked to main frame
I. Matrix Instruments Color Graphics Camera - hooked to main frame

Software used on the Tektronics 4115B, Tecnicap and others

Bay D

11. Techniques Branch

Ron Ware

A. Wyse 75

B. Wyse PC - used for office automation a software testing

C. XT and printer

D. Wyse PC

E. IBM 3279 - hooked at AS/5

F. Intel - hooked to 310 - a standalone

G. Intel - 310 - Wyse 75

H. IBM 3278 - hooked to AS/5

I. IBM 3278 - hooked to AS/5

J. IBM 3278 - hooked to AS/5

K. Wyse 75

2 Wyse PCs that aren't hooked up yet

Any of the IBM 3278's can go to printer hooked to main frame

Bay E

12. Computer Management Branch

Stan Jones

Bay C

13. Maintenance Division PS Magazine Branch

A. Wyse - Standalone (Don Hubbard)

B. Wyse - Standalone - not in use to another division

Office Automation and Plexus to be installed

Bay C

14. Maintenance Doctrine Division

Jim Eastwook

A. Wyse - used for Tool Improvement Program Report

B. IBM 3278 S2K Maintenance Improvement Report; also have a word processor

(Wyse is a stand alone)

Bay C

15. Maintenance Systems

Ray Beattys

Have a word processor and printer

IBM 3278-5 and Memorex printer - hooked to main frame (TAMS)

Adds viewpoint - hooked to mainframe

Infoconversion (on loan) to Susan Bottern to do updates - a stand alone-TAG

The IBM does TAMS

The Adds Viewpoint on 2 systems Wolf and Advance

Joe Oether (in same division)

Plexus 60 to be installed soon. It will expand the office automation and other area - electronic mail for one Unix to access DDN (Defense Data Network) under AS/5

Also have a Burroughs which is hooded to the AS/5 floppys to 9' track tapes
DS level

Bay C

16. SMART Maintenance Board (Maintenance Doctrine Branch)

Basil Cole - Smart

Otis David - Smart

W. M. Oakley - TIPS

1 Wyse PC

Used for Office Automation - stand alone

Deals with old Army maintenance board - revising - administrative

Bay C

Maintenance Division

17. Army Oil Analysis Management Specialists

J. Lin

1 word processor

3 Wangs, 2200 Mini computer system and 2 printers

2 Wangs and Remainder of machines in Room C-9 a Wang disk drive

2 of the Wyse will be replacing the word processor and Plexus to be installed soon.

Bay B

18. Technical Publications

Arthur Rulon

1 Wyse - stand alone - Wordstar

Bay B

19. Technical Publications

1 Wyse - stand alone - dBase

Bay B

Maintenance Division

20. Arthur Rulon's Office

Bay B

Maintenance Division

21. Ed Floreich

1. Adds Viewpoint Modem and printer Communicates PAILS located in Washington and catalog ad agencies ad agencies in Chambersburg.

Bay B

22. Supply Division - Supply Evaluation Branch

G. Giles

Don Hines Chief Equipment Supply Support Division

Have 2 Visual 102s to Plexus

Bay B

23. Supply Evaluation Branch - Combat Operations

Doug Christopher (Chief) 2 Sections

Garry Bowen

Wyse - Modem - stand alone - eventually to main frame

Visual 102 to Plexus

Office Automation

Bay B

24. Barry Bowen

Visual 102

Visual 102 (in Branch Office) G. Giles to Plexus

Bay B

25. Secretary

Visual 102

Office Automation

Bay B

26. George Giles

Visual 102

Bay B

27. Plexus Room and CPU

2 Visual 102s and CPU

Bay B

28. Elkins
possible 1 soon
1 102 to Plexus

Bay B

Supply Division

29. Terry Ridgley - Supply Systems Branch
2 102s to Plexus

Bay B

30. 2 102s to Plexus

Bay B

30. 2 102s to Plexus

Bay B

31. Milsystems
2 102s to Plexus

Bay A

32. Readiness Analysis Equipment Branch - Improvement Branch
John Bodner
No equipment

Bay A

33. Readiness Analysis and Equipment Branch
Mailbag
A. Adds viewpoint - not hooked has modem
B. 2622 MP slates - word processing

Bay A

34. Logistics Engineering Branch (4 Sections)
John Peer and J. Muszik

A. HP 2026W

B. HP 2626W

C. HP

D. HP

E. HP 2524B - modem

F. HP

G. Adds viewpoint - stand alone

H. HP

I. HP

Used for word processing and
programming and evaluation
of systems programs (AMC)

All HPs hooked to HP 3000

Bay A

35. Computer Room
Adds Viewpoint and printer - modem - Time Share Basis
HP 3000
A. Disk Drive 404 Mag
B. Drive
C. HP
D. Tape Drive 1600 BPI
E. Graphics
F. Console
G. HP State 2263A
(See Diagram)

HP 3000 Software

- I. OPERATING SYSTEM
MPE V, Version G.01.01
- II. LANGUAGES
A. FORTRAN/3000
B. BASIC/3000
C. RAPID/3000
- III. PRODUCTIVITY TOOL CATEGORY
A. HPWORD
B. INFORM/3000
C. RAPID/3000
- IV. OFFICE TOOLS FAMILY
A. HPSLATE
B. DSG/300
C. HPSPELL
- V. DATA BASE MANAGEMENT
A. IMAGE/3000
B. KSAM/3000
C. QUERY/3000
- VI. COMMUNICATIONS
RJE/3000
- VII. UTILITIES
A. EDIT/3000
B. FCOPY/3000
C. SORT-MERGE/3000
D. VPLUS/3000
- VIII. RELATED PRODUCTS
A. Dictionary/3000
B. Report/3000
C. Transact/3000

XI. NON-HP SOFTWARE

- A. MPEX
- B. Minitab
- C. Preview

Bay B

36. Programs and Budgets branch

Aaron Lucas

A. Wyse PC and modem - will be linked to AMC - stand alone now

Bay B

37. Management Review and Analysis Branch

Robert Dever

A. Wyse not linked-will go to R. Prikryl

B. Wyse

Used for experimentation

also has Intel 310

wordprocessing (wordstar)

Data Base Management

Lotus 1-2-3

dBase III

Command Performance

Indicator Review Report

-wordstar

Office Automation

38. Security Vault

Diana Richards

1 Wyse PC Stand Alone

Used for parking, clearance, etc.

Bay D

39. Mailroom (IMD - Information Management Division)

Information Resource Management Branch

1 IBM 3278-5 linked to AS/5 (printer also)

Yvonne Wicker

Suspense Report - tracking of mail, letters, reports, and reminder of correspondence.

Bay B

40. Office Services Branch

Doris Gillum

1 Wyse PC - Standalone - Office Automation

2 ABDick hooked to Budget

Bay B

41. Auditor Branch - Internal Review

R. Davis

E. Drenning

1 Wyse PC a printer - stand alone Wordstar and Lotus 1-2-3

Program for Annual Audits

Bay D

42. Operations Research (included in Ron Wares)

Bay D

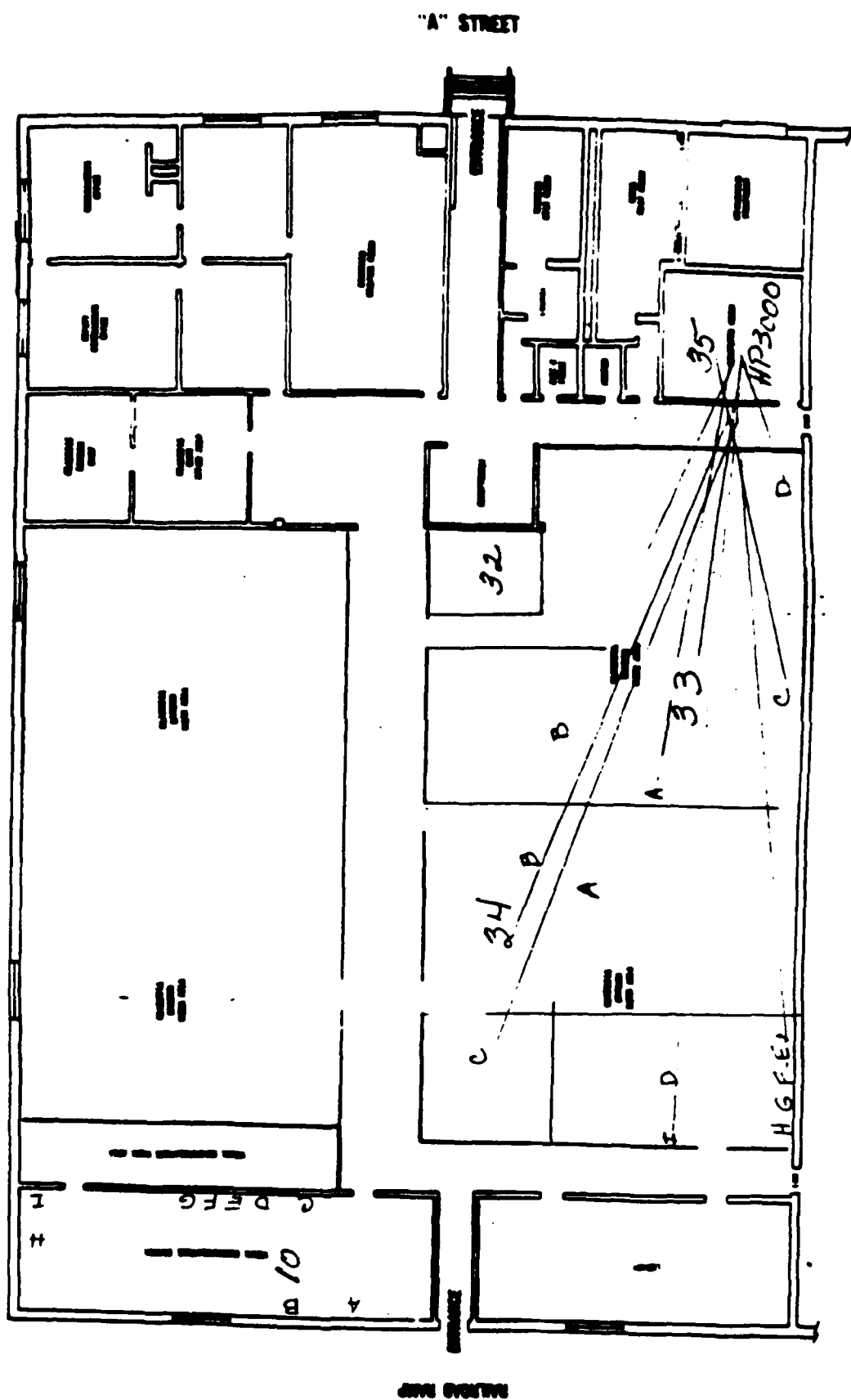
43. Supply Room
Dave Markel, Linda Caswell, Mike Baker
1 Wyse PC and printer stand alone
Inventory, property book and reoccurring reports
44. Commander's Office
Secretary has 1 Wyse PC for Word Processing
45. Deputy's Office
1 Wyse PC

1. Move
ary to B Bay, Tech Pubs Br.

2. Relocation
ation
Jan 85

2. Relocation
within division using the Library
space of 930 sq ft.

WAREHOUSE 4 "A" BAY



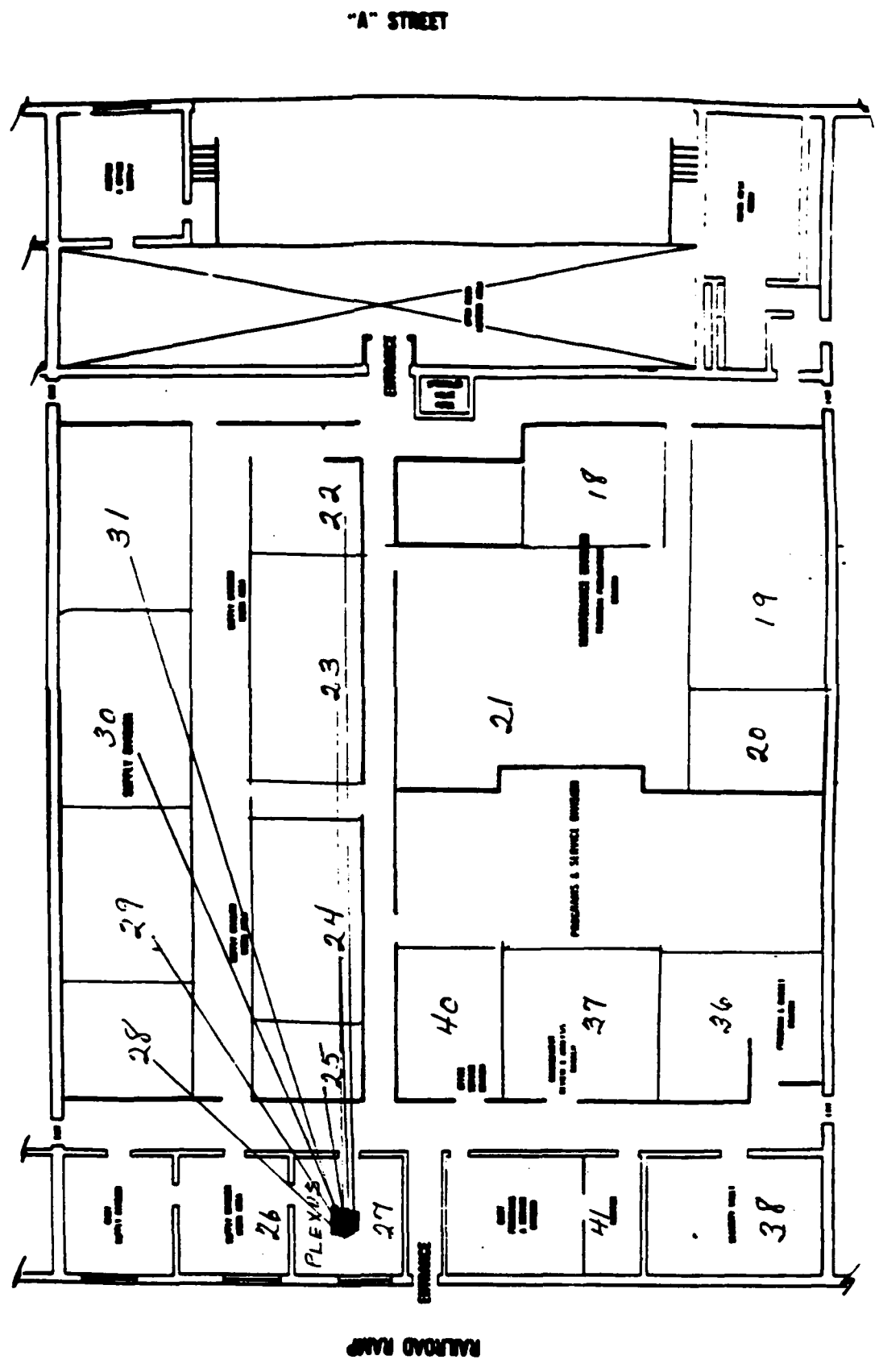
h Pubs

2. Move Library A Bay
Branch Area B Bay

• Pr Relocation
Jan 85

1. Move Finance Division, Tech Pubs
Branch t C. MISD Area

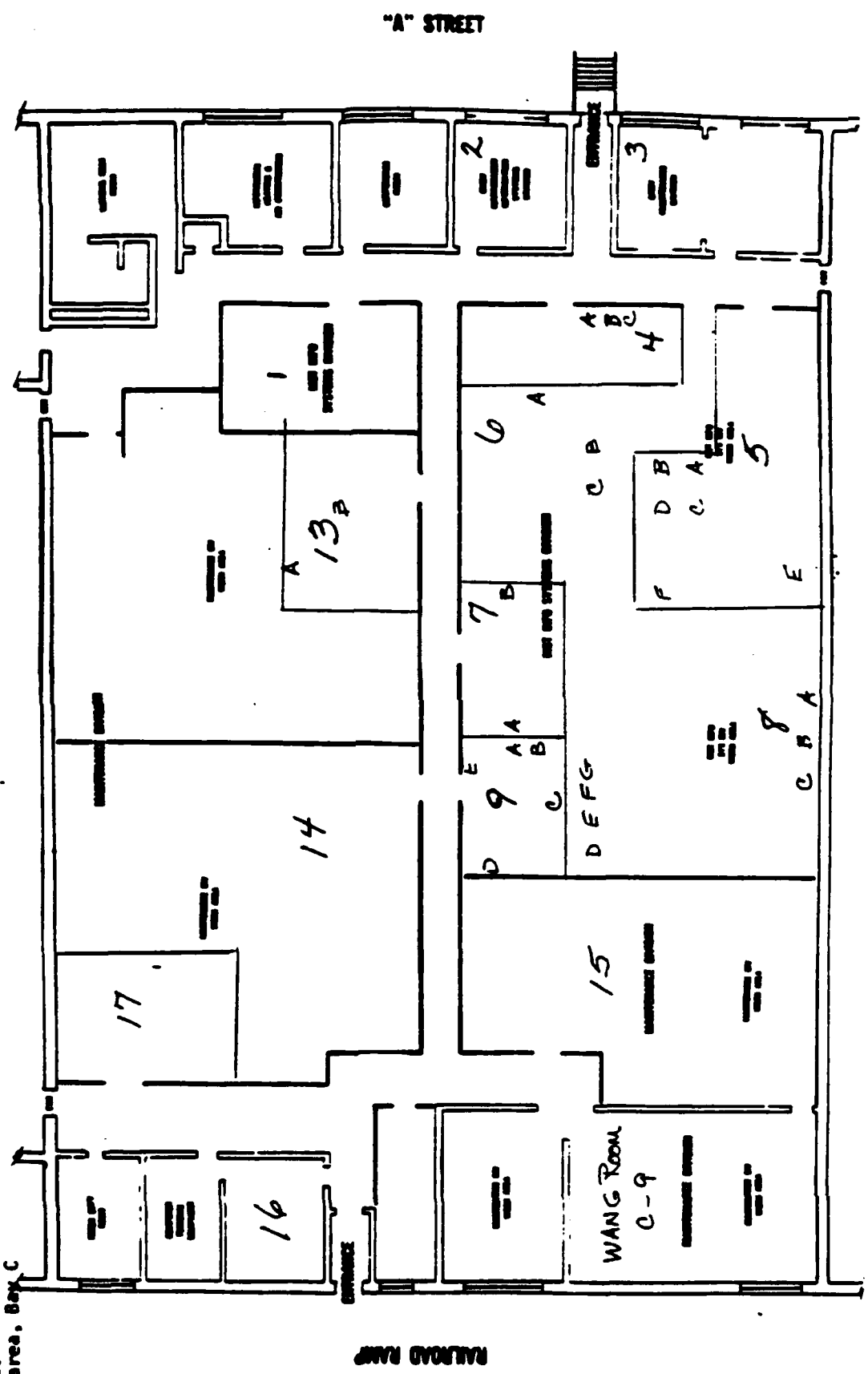
WAREHOUSE 4 "B" BAY



1. Move computer area, TENIS Area and Bay E, old computer area
2. Maintenance Tech Pubs moves into MISD area, Bay C
3. Move C, MISD 0 Bay D Area.
4. Maintenance Division realign within C Bay, as deemed necessary.

Prop location
 Rev. 10 Jan 85
WAREHOUSE 4
"C" BAY

1. Move Division to Bay D, old LRDA
2. Maintenance Tech Pubs moves into MISD area, Bay C



1. Move

2. Move Chief's off

Relocation

P

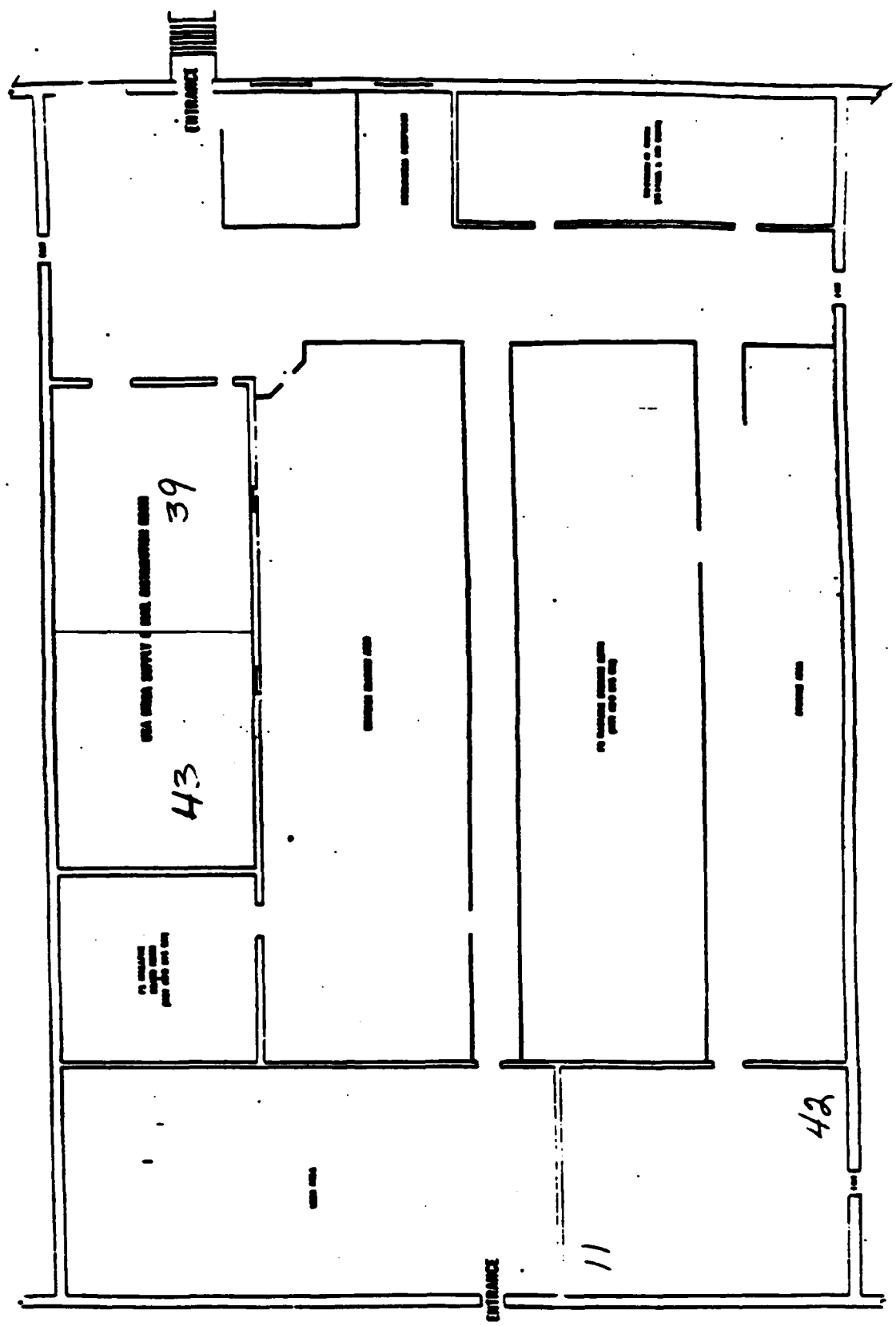
Division into D Bay old LBD

Jan 85

and TEMIS, area and E Bay

WAREHOUSE 4

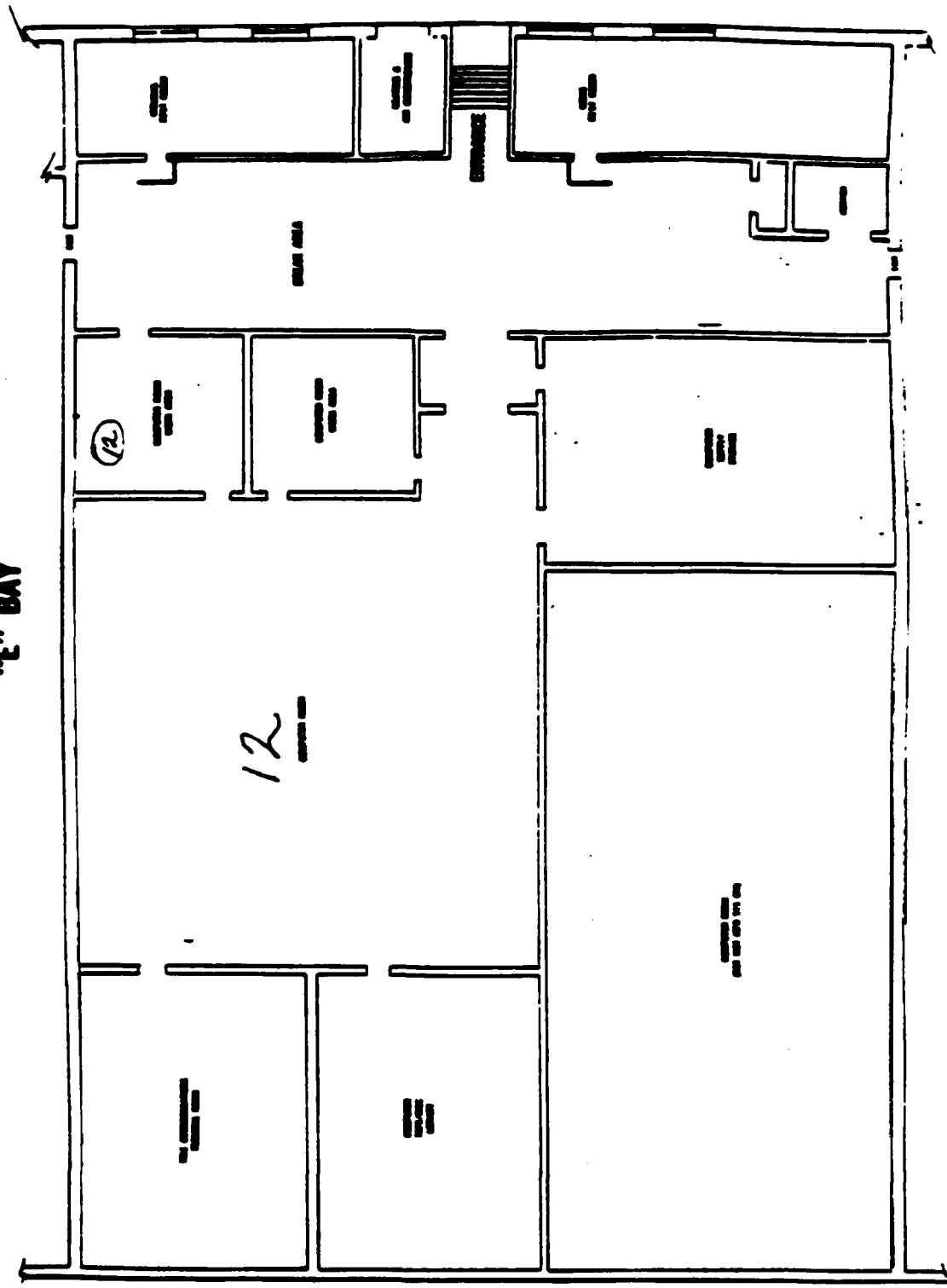
"D" BAY



Relocation
 ...ised Jan 85

**WAREHOUSE 4
 "E" BAY**

1. Mi-
 compute
 size available space in old
 and, approx. 4800 sq ft



RAILROAD RAMP

3 RESOURCE MANAGEMENT DIVISION

Summary of Future ADP Plans

This response includes all future plans indicated in the interviews. Qualifications on the degree of finalization in these plans have been included as quoted from the individuals interviewed.

Division Chief
Rufus Prikryl

The division is asking for division reports on diskettes. He would like to call division reports from a MRSA network and wants to put reports (un-programmed projects and tasks, prioritized projects and tasks, CPIR, and some personnel information) on the Intel 310. Note: there is a confidentiality concern with personnel data on the Intel. His secretary, Fran Marx, will have word processing capability in near future by adding a terminal to the Intel 310 currently in the division. An unresolved question is whether the word processing package available on the Intel (Horizon/I-word) is compatible with the other packages in use around MRSA: Wordstar and AB Dick (ABD) word processing.

Program and Budget Branch
Aaron Lucas

He would like to convert ABD to Wyse/MS-DOS diskettes and files. He would like to get better ABD maintenance service than is currently being provided. His branch must begin using the Wang microcomputer and software sent by AMC for reporting. The branch must begin using one of the AMC approved automated formats for data submission for the Command Operating Budget (COB)/Program Analysis Resource Review (PARR)/Zero-Based Budgeting (ZBB). These format options include: (1) microcomputer data base management system software developed by HQAMC to be distributed in March 1986, (2) mainframe software being developed by TACOM via timesharing, and (3) major subordinate command (MSC) developed software/systems such as SuperComp 20, Informix, CONDOR, Lotus 1-2-3, etc., to produce ASCII files in the formats required by HQAMC.

Joyce Tudor

She will likely start using Lotus 1-2-3 to prepare spread sheets for use in ongoing budget discussions in the P-BAC meetings. Anniston Depot has to make changes in their 218 report to make it more useful for MRSA. This will alleviate the current need to make manual changes to the report. (Note: A logical addition to this area is the creation of electronic 218 reporting to MRSA that will allow needed enhancements to the 218 and special reports to be prepared using Lotus 1-2-3.)

Management Review and Analysis Branch
Robert Dever

Command Performance Indicator Review (CPIRs) is going to be done on Wordstar this year. The branch needs a network for electronic reporting and

Disposition Form (DF) mail. This network should include more viable teleconferencing AMC-wide. AMC will automate the table of distributed allowance (TDA) in the future to allow electronic submission of updates now sent via coded forms and keypunched cards. He also hears that more electronic mail reporting will be available.

Rick Brown

If Wyse PCs are to be used along side of Intel 310s, then a common network needs to be created and file conversion routines need to be written that will take Horizon/I-word format files to Wordstar format.

Offices Services Branch
Doris Gillum

Her branch may be required to put the property book on the IMD mainframe. She is interested in putting several types of form letters and reports on the Wyse PCs using Wordstar and Lotus 1-2-3. The Manning Book (personnel directory) and Principle Action Officer Directory are planned to go on IMD mainframe. She would like to have an automated library catalog.

Virginia Blair

Training of personnel may become computer based. This development would originate out of the military and civilian schools serving MRSA. She may put some standard reports and form letters on the Wyse PC and is currently putting training information on a Wyse PC using dBase III.

Operations Research Office
Lynd and Van Hoose

A general trend is that the AMC OR office is becoming more quantitatively minded, likely leading to increased quantitative demands on MRSA OR. To do their job more effectively, a mainframe computer must be equipped with a complete statistical package (such as SAS) that can be used on an interactive basis with reasonable response time. The size of the mainframe needed is dictated by the MRSA user-division's datasets that OR is asked to analyze. Data collection automation will also be of more concern in the future. To assist in data collection, microcomputers will be called upon. Again, capacity requirements will be determined by the user-divisions.

Supply Room

These people would like a microcomputer to track inventory and to automate office work. They also state a need for a modem.

Description of Automated Systems

Note: A "system" is defined as a work process supported by automated data processing.

Chief

His secretary, Fran Marx, will use a terminal on the Intel 310 for general word processing in the future. At this time, a question of the need for compatibility for documents prepared on the AB Dick, Wyse and Intel machines is pending.

Office Services Branch

Manning Book (personnel directory) is on ABD word processor. It will eventually be moved to the IMD mainframe. The Principle Action Officer directory is also on a word processor and will eventually be moved to the IMD mainframe. The Activity Property Book is updated on the Wyse PC, but it may be moved to the IMD mainframe in the future. In all the above cases, changes are gathered from divisions and other RMD branches and manually entered. The output goes to a printer for publication.

The ABD machine is used for general word processing. The branch is in the process of putting personnel training information on dBase III on the Wyse PC. When completed, the system will allow inputs from various paper sources (primarily schools and the divisions) to be put on the computer for status tracking and reporting to the divisions, people, and schools involved.

Budget and Policies Branch

AMC will allow three software options (including Lotus 1-2-3 templates) to automate PARR/COB/ZBB submissions beginning in July, 1986. This will allow the information gathered from MRSA divisions on paper and diskette to be combined in a standard format for reporting to AMC.

Five-year plan information comes from division chiefs on paper and is typed into a word processor. Once completed, it is sent back to MRSA division chiefs and then to AMC. The prioritized tasks report uses information on paper from division chiefs. It is then typed into the ABD for formatting to AMC requirements before submission. The 159 Report uses Lotus 1-2-3 to summarize written submissions from divisions and internal branch information, some via 218 Report, into a format for external reporting.

The branch receives the 218 Report on hardcopy computer output from AMC. B&P has to make manual changes to this report once received, although AMC will be making some improvements to output in the future. This 218 information is used for a wide variety of purposes by RMD branches. The ABD is used for general word processing including report cover letters.

Management Review and Analysis Branch

Time card information consolidated on the 218 hardcopy report from Anniston is used as the primary input for the work measurement program. The TDA is submitted to AMC on punched cards after collecting data from MRSA divisions, coding onto keypunch forms, and keypunching.

Command Performance Indicator Review (CPIR) is to be done on Wordstar this year. The input for this report comes from action officers in the divisions, with the completed report going back to divisions, to the CO, and AMC. Some parts of this report were previously done on the ABD.

Organization and Functions Manual (10-1) is updated and stored on the ABD. Changes come in on paper with the output going to a printer for wide distribution. The ABD was used to prepare the text portions of the last completed Commercial Activities Report. The branch internally develops Wordstar forms and Lotus 1-2-3 templates for use by other RMD people. General word processing and text for studies is done on ABD and Wordstar.

Operations Research Office

This office uses the Mini Tab statistical package on the HP 3000 and SAS and SPSS on the University of Kentucky mainframe computer (when data are not classified). They interact with data bases of other divisions as needed on a project. While this office may influence data inputs for a project, the inputs and outputs of their work are all within the requestor division and are most often already stored on the IMD mainframe or HP 3000 computer. They have just received a Wyse PC and are beginning to use it as they learn about it.

Supply Room

Linda Caswell, Mike Baker and Dave Markel have been working with IMD to get the MRSA Property Book on the AS/5. Mike Baker is also using IMD's AS/5 for requisition/document expenditures. The data for these systems come from internal sources gathered over time from the divisions and external sources.

Data Description

Office Services Branch

The Manning Book on ABD word processor requires personnel change information from the divisions or the personnel centers in MRSA and/or LBAD.

The Principle Action Officer Directory on a word processor also requires change information from the divisions.

The Activity Property Book is on a Wyse PC. This requires change input from the divisions to maintain.

Personnel Training Information is in dBase III on the Wyse PC. When completed, it will use inputs from the divisions (requests, qualifications, and waivers) and the external schools (offerings, acceptances, registrations, reservations, and grades).

Budget and Policies Branch

The COB/PARR/ZBB automated reporting system to AMC uses Lotus 1-2-3 templates or other means provided by AMC is on the Wyse PC. When implemented in July of 1986, this system will require budget, manpower, performance, and requirements information from the divisions. The information is submitted via DF, special circular, or action officers.

The 5-year plan and task prioritization reports are on ABD word processor. These reports require planning and prioritization information from all divisions for formatting on the ABD machine to report specifications.

The 159 Report is on Wyse PCs using Lotus 1-2-3. This report requires written submissions of actual and/or projected information from the divisions on DFs and information kept on a standing basis in B&P from the 218 Report.

The 218 Report is from Anniston Depot. In this system, B&P and other RMD branches are users of hardcopy output from a computer program for budget tracking at the Anniston Depot. To drive the system, MRSA sends Anniston periodic reports on budget progress.

Management Review and Analysis Branch

For the Table of Distributed Allowance, MR&A gathers information from MRSA divisions, and internally from their branch, which they then code onto keypunch forms, keypunch, and send to AMC.

The Command Performance Indicator Review (CPIR) is on Wordstar. The input for this report comes from action officers in the MRSA divisions.

The Organizations and Functions (10-1) Manual is on the ABD. Changes come in on paper from the divisions.

Operations Research Office

This office handles Mini Tab, SAS, and SPSS statistical packages. Inputs for the Mini Tab package, which runs on the HP 3000, come from data sets of requestor division that are already on the HP 3000 or can be put on the HP 3000. Inputs for the SAS and SPSS packages, which run on the University of Kentucky mainframe, are nonclassified data that come from the requestor division.

Supply Room

The Supply Room handles the Property Book and Requisition/Document Expenditure Data Bases. The data for these systems come from internal sources gathered over time from the divisions and sources outside MRSA.

Information and Data Sources and Their Relationships

The key points to make here are the following:

- 1) RMD currently has no mainframe programs or data files that it is considered owner of. This means that there are no automated system information and data sources to examine for redundancy.
- 2) However, while there are no mainframe data files to be concerned about, the potential for redundant data proliferation on the micros should be considered. Due to the early stages of introduction of these micros, interviews indicate that there is no significant issue in this area at the present time. One exception is that three different word processing packages are currently in use on the three types of micros in RMD: AB Dick, Wyse PC, and Intel 310. This is giving rise even now to manually copying data from one machine to another.

- 3) While there appear to be no significant automated system redundancies, one paper redundancy is of note. The Command Operating Budget, Performance Analysis Resource Review, and Maintenance Support Activity carry significantly overlapping information. Aaron Lucas has suggested that these reports may be candidates for merger. The merger potential seems to be at least partially recognized by AMC via the automated combined reporting for the COB, PARR, and ZBB documents AMC is instituting.

Organizational Information

As summarized from the Organizations and Functions Manual, the key functions of RMD are to support MRSA and its commander with assistance in budgeting, finance, accounting, work measurement, internal controls, management analysis, operations research, progress, and statistical reporting and analysis. This includes the development and presentation of needed data, establishment of systems to facilitate these functions and administration of these management and monitoring activities.

A significant functional difference of RMD with respect to other MRSA divisions is that it is more structured in activity and work flow relative to other MRSA divisions. This is because its function is regulated to a fairly high degree by AMC and other external reporting activities.

RMD is further characterized uniquely by its high volume of communications with external organizations and by its relatively equal volume of communications across all MRSA divisions. There were no self-identified role differences offered in the RMD interviews.

Note: 1. The people identified below include only interviewees and persons directly referred to by interviewees. 2. The developer of many micro computer based applications is Rick Brown of MR&A Branch, the RMD "automation expert."

Office Services Branch

The Manning Book on the ABD word processor is owned/managed by Doris Gillum, acting branch chief.

The Principle Action Officer Directory on a word processor is owned/managed by Doris Gillum, acting branch chief.

The Activity Property Book on Wyse PC is owned/managed by Doris Gillum, acting branch chief.

The Personnel Training Information on dBase III on the Wyse PC, is owned/managed by Doris Gillum, acting branch chief. Virginia Blair, office services assistant, is the primary end user and partial developer.

Budget and Policies Branch

The COB/PARR/ZBB automated reporting system to AMC using Lotus 1-2-3 templates provided by AMC is on the Wyse PC. AMC is the owner/developer. Aaron Lucas, branch chief, is the manager.

The 5-year plan and task prioritization reports are on the ABD word processor. Aaron Lucas, branch chief, is the owner/manager. The branch secretary, Carol, is a primary user for data entry purposes.

The 159 Report is on Wyse PCs using Lotus 1-2-3. Aaron Lucas, branch chief, is the owner/manager. Pat Reed, Jan Lincoln and Joyce Tudor, budget analysts, are the primary users.

The 218 Report is from Anniston Depot. AMC is the system owner. Aaron Lucas, branch chief, is the manager at MRSA.

Management Review and Analysis Branch

The Table of Distributed Allowance is owned by AMC. Robert Dever, branch chief, is the manager at MRSA and a user.

The Command Performance Indicator Review (CPIR) is on Wordstar. Robert Dever, branch chief, is the owner/manager. The branch secretary is the primary user for data entry.

The Organizations and Functions (10-1) Manual is on the ABD. Robert Dever, branch chief, is the owner/manager.

Operations Research Office

The Mini Tab statistical package is on HP 3000. The Readiness Division is the primary manager. Ernest Van Hoose and Michael Lynd, OR analysts, are users.

The SAS and SPSS statistical packages are on the University of Kentucky mainframe. University of Kentucky is the manager. Ernest Van Hoose and Michael Lynd, OR analysts, are users.

Supply Room

Linda Caswell, Mike Baker, and Dave Markel have been working with IMD to get the MRSA Property Book on the AS/5. They are user/managers of this data. Mike Baker is also using IMD's AS/5 for requisition/document expenditures. He is the manager/user of this data.

Flow Diagrams and Descriptions

Again, caution should be exercised when drawing inferences from the flow diagrams in this section. The flows have been aggregated and do not necessarily imply the volume.

RMD Contacts With IMD

With some exceptions, the following lists contacts between RMD and IMD that are beyond normal administrative communication between the two divisions. This has been done to better focus on the issue of systems development.

Chief. Meets weekly with IMD chief in a MRSA-wide division chiefs meeting with the Commander.

Office Services Branch. Gets office automation ideas from Ron Ware in Techniques Branch of IMD. Is talking with IMD about putting Manning Book (personnel directory) on the mainframe.

Budget and Policies Branch. Gets information from Lana Lyons IMD's action officer on automated data processing (ADP) contracts and processes the contracts. Received training on Wyse PC micro computers from IMD. Not all staff members have received training yet, but most are scheduled to receive some. Staff members that have received training are very positive on future applications. Some are also pleased with the fact that they could stump the Lotus 1-2-3 trainers. Joyce Tudor talks with Ralph Mitchell of IMD informally.

Management Review and Analysis Branch. Two staff members have taken IMD training on dBase III, although not much use has been made of this package yet. Rick Brown is the automation expert for RMD. He determines what will and what will not be automated. He sets up Wordstar forms and Lotus 1-2-3 templates for other RMD people.

Operations Research Office. Mr. Lynd and Mr. Van Hoose talk with Ralph Mitchell on potential acquisitions. At the direction of the Deputy, they prepare need analyses for potential new IMD computing equipment. They have been talking with IMD in conjunction with Readiness Division on the need for and potential acquisition of a more powerful statistical package.

Supply Room. Linda Caswell, Mike Baker and Dave Markel have been working with IMD to get the MRSA Property Book on the AS/5. Mike Baker is also using IMD's AS/5 for requisition/document expenditures.

Note: Most of these communications channels, with the exception of formal microcomputer training, have developed and are maintained on a very informal basis.

Resource Management Division

Note: This section treats all RMD branches with the exception of the Operations Research Office. Because of the unique character of this office, its information flows are described in a separate section immediately following this section.

Flows with MRSA CO and Deputy. Information flowing up to the CO and Deputy includes: RESHAPE, COB, PARR, cover letters for external reports, drafts of narrative analyses, organizational and staff studies results, budget priority reports, MRSA control program, CPIR, and the Comptroller Independent

Review and Analysis. Also flowing upwards to the CO's secretary are citations for proofreading.

Information flowing down to RMD includes feedback on all of the above items, requests for organizational and staff studies, and requests for special operating reports.

Flows with all MRSA Divisions. Note: This flow is defined as contacts that occur between RMD and all other MRSA divisions for normal administrative purposes.

Information flowing to all MRSA divisions includes: committee representative needs, accumulated suggestions, training surveys, award information, completed CPIR, completed Comptroller Independent Review and Analysis, Organizational and Staff Studies, MRSA Control Program, RESHAP, PARR, COB, and budget priority report.

Information flowing to RMD includes: general budget information and requests, budget priority information, feedback to P-BAC, commercialization information, 159 Report, 5-year plan information, MRSA control information, vulnerability assessments, CPIR input, special request information, organizational and staff study information, budget and manpower requests, contract input, personnel requests, nominations, suggestion replies, telephone installation requests, committee representative names.

Flows with Information Management Division (IMD). (Note: Only information unique to the RMD-IMD link is presented here.) Information Flowing to IMD includes: requests for RMD computer acquisitions, IMD ADP contract information, requests for visual chart creation, and general computer support.

Information flowing back to RMD includes: ADP contract information, training, automation ideas and plans, acquisitions, completed visual charts, and property book support.

Flows with Maintenance Division (MD). (Note that only information unique to the RMD-IMD link is presented here.) Unique information flowing to and from MD is limited to information on the MSA report.

Flows with external military and nonmilitary schools and training centers. Information flowing to the schools includes registration and wavier material. Information flowing back to RMD includes: course lists, requirements, and completion information.

Flows with the Army Audit Agency. Flow with the AAA includes Commercialization Report information and feed back on the report.

Flows with AMC. Flows to AMC include: COB schedules, manpower reports, CPIR output, punched cards with TDA information, organizational and staff studies, commercialization reports, Internal Control Review reports, requests for contracts, and certificates of payment.

Flows from AMC to RMD include: payroll and transfer information, expense summaries, feedback on reports and submissions, special inquiries, list of dates that award information is due, and Army and AMC Regulations.

Flows with LBDA. Flows to LBDA include: Purchase information, return of purchase request forms, citation copies, award nominations, personnel requests, and fire and safety reports.

Flows to RMD from LBDA include: committee representative needs, suggestions from MRSA staff, purchase orders, purchase request forms, and commercialization information.

Flows with Anniston Depot. The flow between RMD and Anniston consists of sending raw MRSA budget information and receiving computer-summarized output on hardcopy.

Flows with Tobyhanna Depot. The flow between RMD and Tobyhanna consists of requests for, and reporting of, copier cost and production information.

Flows with hotels, convention centers and travel agents. The flow between RMD and this group of external contacts consists of making reservations and receiving confirmations on MRSA-related travel activities.

Operations Research Office

The volume of communication to a given destination noted on the diagram varies considerably based on the active projects at a point in time.

Flows with the CO and Deputy. The flows to the CO and Deputy are for the passing of project assignments/instructions and for receiving reports on project status and outcome.

Flows with Office Services Branch. The flows here are for the provision of clerical support.

Flows with external sources for data and techniques. The flows here are used to facilitate external data searches and retrievals in support of assigned projects.

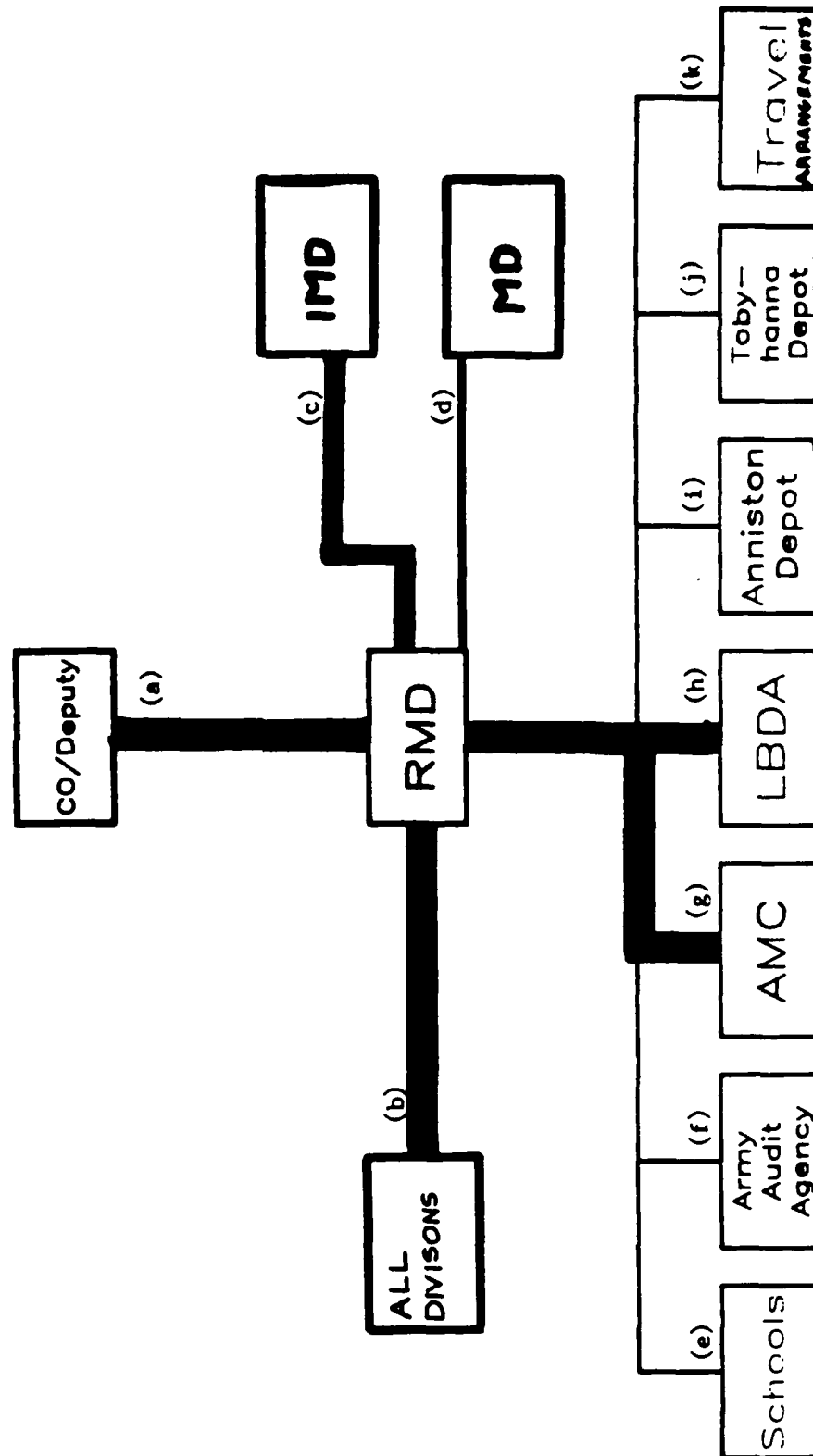
Flows with University of Kentucky Computing Services. Flows to and from UK have been created as OR reaches out for additional computing power on nonclassified projects. UK provides computer consulting (primarily statistical) in support of OR program runs.

Flows with Army-wide organizations. Army-wide units send OR information on their programs for OR to evaluate and review.

Flows with "client" divisions. These flows consist of information exchange in support of OR assignments on a division project. Note that coordination of much activity is handled through a project officer in the client division.

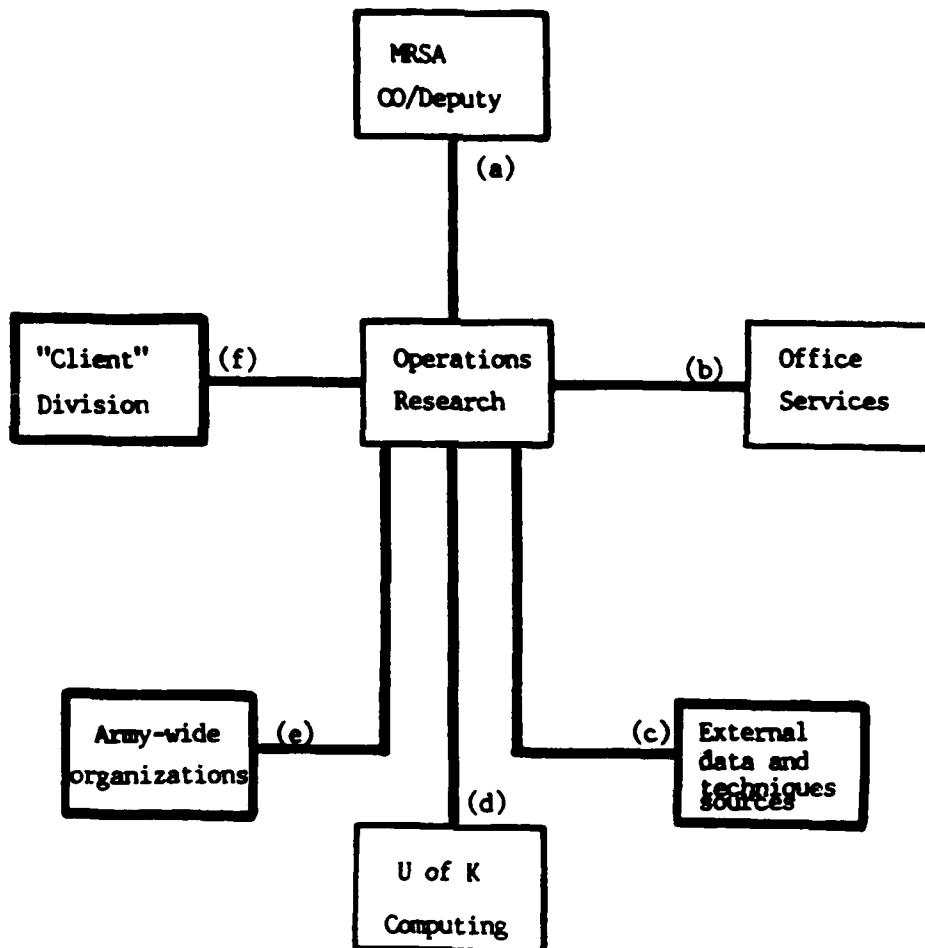
RMD Information Flow Diagram

(Relative flow volume shown by line width)

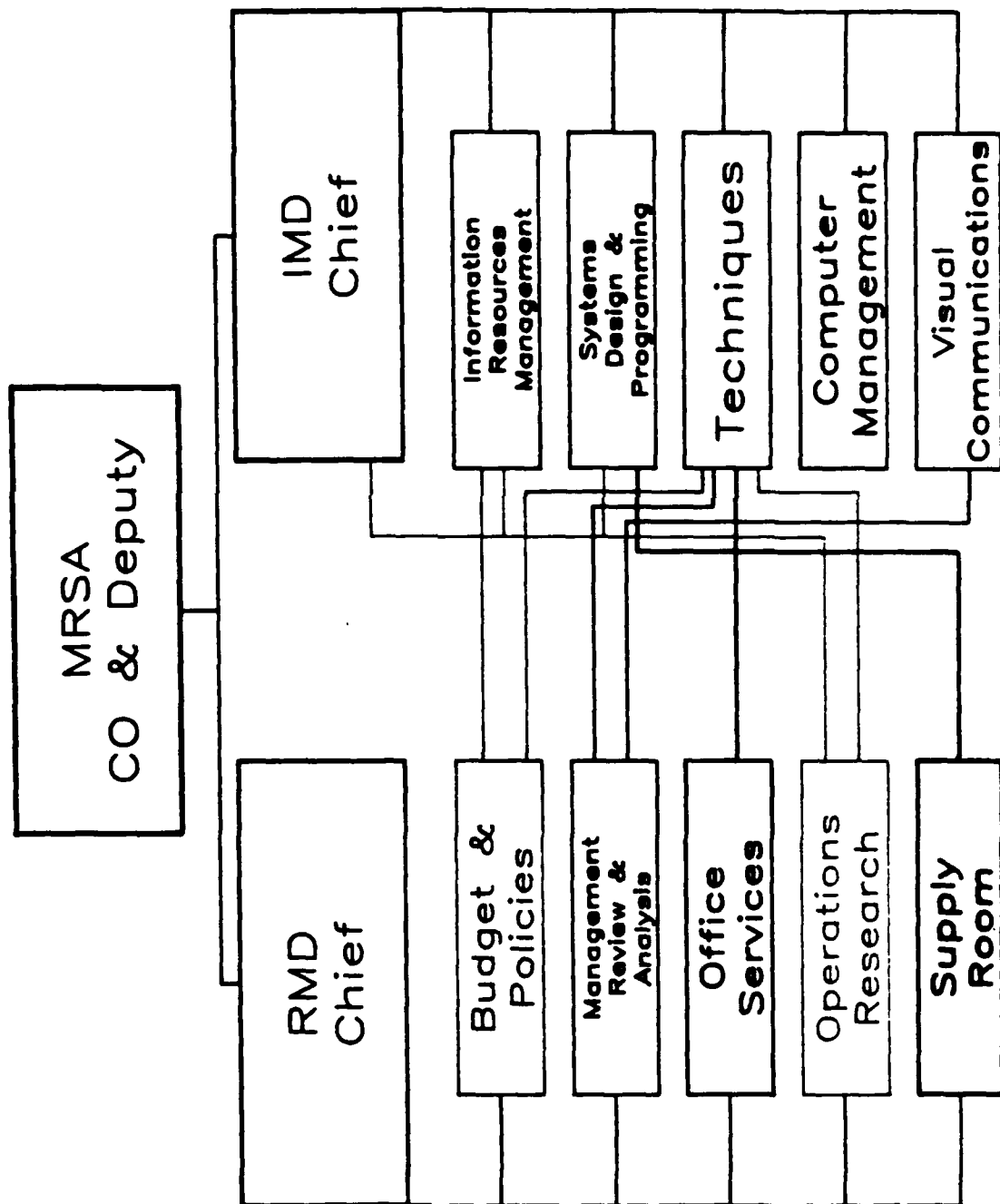


OR Information Flow Diagram

(Relative volume noted on attached sheet)



RMD - IMD Communications Chart



Communication Mode and Destination Summaries

Note: It is difficult to make inferences on the mode of communication that passes the most information due to the fact that distribution of a written memo/DF and other variables are not known. We can more accurately infer how much time is spent on preparing or engaging in each mode of communication. We assume the heading "verbal" to mean "in person."

Division Chief, Rufus Prikryl. Communication is evenly split between within division and without division. Most of his time is spent engaging in verbal communication (either in person or via phone) over written communication.

Budget and Policies Branch. Highest order volume destinations of communication are all MRSA divisions as a whole, AMC, and LBAD. Second order volume destinations are Office Services branch, RMD chief, and the MRSA CO. Third order destinations are Management Review and Analysis Branch, IMD, MD, and Anniston Depot.

Aaron Lucas

His heaviest mode of communication is verbal. The destinations of all communication are evenly split in and outside the division.

Joyce Tudor

Her heaviest mode of communication is verbal. The heaviest destination of communication is out of her division and MRSA.

Management Review and Analysis Branch. The highest order volume destinations for the branch are all other MRSA divisions as a whole, AMC, and Budget and Policies branch. Second highest order volume destinations are the RMD chief and the MRSA CO. Third order destinations are Office Services Branch, LBDA, and Army Audit Agency.

Robert Dever

Most of his communications are internal to RMD and are in verbal form.

Richard Brown

Most of his communications are outside of his division/MRSA in verbal form.

Office Services Branch. The highest order volume destinations for the branch are all other MRSA divisions, the RMD chief, and LBAD. Second order destinations are Budget and Policies branch and external schools. Third order destinations are Management Review and Analysis Branch, Tobyhanna Depot, AMC, and travel arrangement contacts.

Doris Gillum

Most of her communications are outside of RMD/MRSA and are verbal.

Virginia Blair

Most of her communication is outside of RMD/MRSA.

Operations Research Office. The heaviest mode of communication is verbal. The heaviest destination of the communication is split between outside of RMD/MRSA and within the OR work group.

Supply Room. Most communication is incoming from other units in MRSA. This communication is primarily received in phone calls and written form rather than personal contacts. Note: as most of communication is incoming, no volume destination diagram has been created for this unit.

4 MAINTENANCE DIVISION

Summary of Future ADP Plans

The Maintenance Division of MRSA is charged with the responsibility for staff management of the Army equipment maintenance. An adjunct responsibility is the management of the Army Oil Analysis Program, in conjunction with the Joint Oil Analysis program.

Division Chief

Gayle Rees would like to see the PS magazine branch more fully automated. Specifically, he would like to see on line article composition, electronic manuscript layout and design, and production of camera ready articles through the use of computer graphics systems. He would also like to see the oil analysis data base included in the ADVANCE data network.

Army Oil Analysis Program

Cyril Brown, Branch Chief; George Shannon, Section Chief, Field Operations Section; Cleta Allen, Statistical Computer Operator.

The Oil Analysis Program would like to network the divisions into the PLEXUS 60 system to expedite communications at all levels. The group expects the Oil Analysis data base to be fully interactive. In addition, they would like the Oil Analysis data base to be easy to analyze by staff using spreadsheet and statistical analysis software.

The group would like expanded automation equipment; more terminals, more word processing workstations, and printers for action officers and clerical staff. Cyril Brown would also like to give action officers better access to the Oil Analysis data base.

Maintenance Doctrine Branch

Ed Geilear, MARC POC; Debbie Hollon, MARC Action Officer.

The Branch would like to improve the Manpower Requirements Criteria (MARC) data system. They are concerned that the proposed improvements may overload the AS/5 S2K data base system still further.

SMART Office

The staff of this office would like a data communications link with the MSCs and AMC.

PS Magazine Branch

James Boblenz, Managing Editor, PS Magazine

The PS Magazine office will receive a terminal connected to the PLEXUS network for interoffice electronic mail. He has no other plans, and sees no need for increased automation of the branch. They want no changes.

Technical Publications Branch

Ed Florreich, Data Group Leader.

The branch is expecting an INTEL 310 system with eight terminals to service the Equipment Oriented Publications Data base (EOPDB). It is expected that the data base will reside on the INTEL 310 system or on a system that INTEL can easily communicate with. Plans include the ability to do online inquiries and updates to the data base. They would like menu driven editing software to allow updates.

In addition, they would like to provide interactive inquiry access to the Equipment Oriented Publications Data base to the six MSCs. Integration of the data base with TAGO's Army Publications Directory is also being discussed.

Art Rulon, Branch Chief.

Mr. Rulon expects the PLEXUS system to provide a data network to other divisions. He would also like to expand the word processing network currently in use by clerical support staff. Discussion concerning the possibility of document digitization to eliminate duplication of publications is being considered.

Description of Automated Systems

Note: A "system" for this purpose is defined as a work process supported by automated data processing.

Chief

No specific information was available on systems directly used by the branch chief. He is very supportive of the concept of automated systems used by units within the division and is actively encouraging the increased automation of the unit.

Army Oil Analysis Program Branch

The Army Oil Analysis Program (AOAP) maintains a data base that is used to perform oil usage analyses on every item of equipment owned by the Army that uses oil. This system is currently maintained on the AS/5 system with distributed input from a WANG 2200 system.

The purpose of this data base is to enhance lab effectiveness, efficiency, compliance, and cost avoidance.

System Inputs. Approximately 22 laboratories around the world are charged with data collection for the AOAP data base. The data are mailed to MRSA on WANG 2200 floppy disks. The disks are used to update the data base maintained on the WANG using AIMS software.

System Organization and Processing. The AIMS software receives the floppy disk data and posts them to the data base maintained on the WANG.

System Outputs. The system is used to produce consolidated reports and studies for use in the field and in conjunction with the joint Armed Services data base of oil analysis data (The CEMS system).

Action officers within the AOAP require data from the system in the process of the function of AOAP. They are dependent on programming staff within IMD to generate reports from the data base. The data collected and reported from the data base are used to produce articles for bulletins with topics such as problems addressed by the action officers.

The data extracted from the data base is used to support directives to the field laboratories.

Perceived System Deficiencies. In all cases where the AOAP action officers require data to be extracted from the data base, the complaint was made that there was lengthy turnaround time between the request for programming support from IMD and the completion of the programming assignment. A suggested solution for this perceived deficiency would be to give action officers better access to the data base, especially interactive access to the data base. As a further step, the action officers would like the capability to do their own programming.

Maintenance Doctrine Branch

The Maintenance Doctrine Branch maintains the Manpower Requirement Criteria data base. This data base contains basic data necessary to decide what maintenance personnel are required to support a given combat unit. Maintenance Doctrine uses the information contained in the MARC data base to determine the mean time to repair a particular piece of equipment, based on factors such as the Military Occupational Specialty or MOS. Maintenance Doctrine uses this information as support for policymaking.

System Inputs. Data is supplied from the six Major Subordinate Commands on a form 1947-R, via magnetic tape, QQPRI's (hardcopy) or in letters.

System Organization and Processing. Data is received, in hardcopy and in machine readable format. No description of the process of converting the hardcopy to machine readable format is available. The transaction data is edited and posted against an S2K data base consisting of approximately 13,000 records. The posting is an overnight process.

System Outputs. The MARC data base is an online data base, containing unclassified data. Therefore, the data base is available to any MARC user through an online S2K query. There is only one terminal available for data base query. Most research, using data contained in the data base is analyzed using hardcopy reports due to the very slow turnaround time for interactive use of the data base system.

Perceived System Problems. Online access is "sluggish." There is no interactive editing. Programming slow, at best overnight. The S2K data base manager and the AS/5 computer is slow to respond to queries. Operating hours of the data base query system are 9:00 to 14:00 daily, which is much too restrictive. There is significant concern that the S2K data base system is much too small to handle the projected growth of the data base.

SMART Office.

Word processing automation efforts are being undertaken by Basil Cole of this office. Data is being organized on a limited, but growing basis by William Oakley using dBase III. Oakley also keeps some of his information on tool improvements on the IMD mainframe.

Maintenance Systems Branch

The Maintenance Systems Branch has responsibility for several systems. They are described individually.

The Army Maintenance Management System (TAMMS). This system maintains usage, ownership and other information for all army equipment. The Army's vehicle registration program is maintained under TAMMS. TAMMS is being superseded by SAMS, the Standard Army Maintenance System, currently under development.

System Inputs. Data supplied to the system consists of equipment control record documents, originated in the field as recorded on form DA 2408-9, the Equipment Control Record. Approximately eighty percent of the nearly 650,000 annual transactions are processed from hard copy into machine readable media, including AUTODIN, the Automated Digital Information Network. These machine readable documents are usually punched paper cards or magnetic tape, created at centralized data reduction centers. The machine readable data is forwarded to MRSA for validation, editing, and updating of the TAMMS data base. Approximately 20 percent of the data is sent directly to MRSA in hardcopy format. This data is keyed by Maintenance Services using a keypunch/verify process.

The edit failure rate on data transmitted to MRSA is approximately 30 percent. Data that fails the edits are then manually researched to correct the problems found in the edit phase. Usually this means that the document must be backtraced, often to its originator. Once the data has been corrected, it is resubmitted for processing.

System Organization and Processing. The data base consists of approximately 1 million records, with approximately 650,000 transactions per year. It is stored on the S2K data base system. Incoming data not in machine readable form are keypunch/verified and edited with the aid of computerized batch editing systems.

System Outputs. The system is used to provide data and information on the serial numbered items of the USA, USAR, and ANG, by ownership and location. Usage of combat, tactical, and nontactical equipment is included. This data is classified. Summaries and reports are generated by the system and are used to develop TAMMS policies and to examine compliance with existing policies. There is no current online access to the data base, due to the classified nature of the data.

Perceived System Problems. The classified nature of the data is very restrictive. There is no online access to the data base. Quality of input data is low, with a 30 percent error rate. Researching errors is extremely time consuming, often requiring contact with the data originator in the field.

There does not appear to be any simple answer to this problem, other than to exhort the field personnel to be careful. The data reduction centers in the field are inadequate to process all the incoming forms. This places a heavier burden on the division to get these forms processed.

Standard Army Maintenance System (SAMS)

This system is the next generation of the TAMMS system. It is currently under development and is intended to replace the TAMMS system. This data base will contain all of the current TAMMS data and will include additional data elements to support the MS mission.

System Inputs. The system is fed by a subsystem known as MRM, the Maintenance Reporting System. Data comes from approximately 80 field stations on magnetic tape, monthly. Additional data comes from two field activities on a weekly basis on 5.25-in. floppy disks. The magnetic tape system is being phased out in favor of floppy disks. Eventually, eighty floppy disks will be used to collect the data. Preferred is the collection of the data by communications network.

System Output. Updated SAMS data is collected and recorded on magnetic tape and is forwarded to the MSCs and archived at MRSA.

Perceived System Problems. It is desired that data entry information be transferred over data communications circuits. At present, this is seen as impractical due to the low speed of data communications currently available and the poor response times of the mainframe system.

Work Order Logistics File System

The WOLF system contains work order information for equipment maintenance, including costs and downtime. The WOLF data base is an extract of certain data from the SAMS data base. Much of the discussion on SAMS applies to WOLF.

Perceived System Problems. The system is stored on the AS/5 mainframe, and that system is excruciatingly slow to respond to online queries. Furthermore, the data base is only available for about 4 hours per day. The division requires access for a full 12 hour day, within the year. They would like to install the system on the PLEXUS computer but are concerned that it will not have the capabilities to store it.

Maintenance Support Activities

The MSA data base stores and processes Army maintenance information that provides data for the Army budget analysis program.

System Inputs. Data is forwarded to MRSA on magnetic tape or via data communications channels from the MSCs.

System Organization and Processing. The incoming data is processed by a subsystem called Maintenance Data Management System. This system edits and reconciles the data and posts it to the MSA data base and produces reports for the AMC. The data is posted monthly.

System Outputs. A quarterly report is run and sent to AMC.

Army Data Validation And Netting Capabilities Establishment

The ADVANCE system will give users interactive access to most of the MS data bases through the PLEXUS-60 system. ADVANCE is currently under development, and it is not clear if it is currently operational. ADVANCE will eventually incorporate interactive access to WOLF, SDC, FEDC, MARC, and the AOAP data base, as well as others as the need becomes known.

Perceived System Problems. The major concern is that of capacity planning. Will the PLEXUS system be powerful enough to handle the workload, without becoming overloaded as the AS/5 system has?

Technical Publications Branch

The Technical Publications Branch uses and is responsible for the Equipment Oriented Publications Data base. The EOPDB is used for tracking and indexing all DARCOM related publications.

System Inputs. Information comes to the VM and A section of Technical Publications branch. This information is supplied on DARCOM form 1217-R, DA form 260, Material Fielding Plans, and the Draft and Published Equipment Publications. This information is received by mail.

System Organization and Processing. The data base is an S2K data base stored on the AS/5 mainframe. Incoming data is transcribed onto input forms: The Equipment Coverage/Application Record, The Scheduled Publication Record or the Published Publication Record. These forms are forwarded to the Federal Prison Industries for key data entry, weekly. A batch update to the IMD EOPDB data base is run every 6 weeks.

System Outputs. At update time, the entire data base, approximately 5400 pages, is produced along with an S2K query file. S2K is not accessed interactively. All queries are processed as part of an overnight batch processing system.

Perceived System Problems. The data entry step introduces excessive handling of data. The keypunching step should be replaced with an interactive update that would allow end-users who are directly concerned with the accuracy of the data to enter the data directly into the data base. The online entry should include interactive edits and should be user friendly. This would also allow interactive queries.

PS Magazine Branch

By using an ABDick MagnaSL, this branch converts ABDick 8-in. disks to 5-1/4-in. disks to be used by PCs. This is unique to the branch within MRSA.

There are no automated systems within this branch and the branch management is at least tacitly opposed to any such automation.

Organizational Information

Proponent and Significant Functional Differences within MRSA Organization

This division largely follows the organization described in the Organization and Functions Manual.

Functional Users

As described in previous sections, the functional users are the action officers of the branches, with notations made when users of the data are outside of MRSA. The Major Subordinate Commands and the Army Material Command are significant recipients of the data from the systems described above.

Flow Diagrams and Descriptions

Maintenance Division Contacts with IMD

Chief. Meets weekly with IMD chief in a MRSA-wide division chiefs meeting with the commander.

Army Oil Analysis Program Branch. Cyril Brown requests programming support from IMD where appropriate to do data collection and analysis on the oil analysis data base. Contact is with Maintenance Data Collection Section of the Systems Design and Programming branch of IMD. Barbara B. Hendren is the assigned system contact for AOAP.

Maintenance Doctrine Branch. Ed Geilear works with the Readiness System Support Section of the Systems Design and Programming Branch for any programming support of the Manpower Requirement Criteria (MARC) data base. The principal contact is Connie Popp.

Maintenance Services Branch. This branch appears to have the greatest need for close cooperation with IMD programming and support services. This branch is charged with maintaining the TAMMS data base, MSA data base, WOLF, ADVANCE, and SAMS. All of these are large projects and require close coordination between the MS branch and the relevant areas within IMD. There is close contact with the Techniques Branch of IMD for support of the new PLEXUS network system. The PLEXUS system will host the ADVANCE data network.

For other data base systems supported by Maintenance Services, the Systems Design and Programming Branch of IMD is the contact point. Contact points are varied and the two units must coordinate their work. Contact point for the TAMMS data base are C. Webb and J. Byrd, Maintenance Data Collection Section of Systems Design and Programming Branch. The Maintenance Support Activity contact is E. Thacker, in the Supply and Equipment Section of the Systems Design and Applications Branch.

Technical Publications Branch. Programming support for the Equipment Oriented Publications Data base is supplied by IMD, Supply and Equipment Section of the Systems Design and Programming Branch. The principal contacts are Ed Florreich, of Technical Publications and Lewis Hart of IMD. The systems contact person is Harvey Goins.

Other contacts within IMD include the Scheduling officer of the computer management branch to request a batch update of the EOPDB system. Currently, update data are supplied on punched cards.

PS Magazine Branch. There was no clearly identified contact with IMD.

Maintenance Division

Flows with AMC. Flows to AMC include: SDC, MWO, RIDB, and MCSR outputs and reports. Flows from AMC are primarily DRS information.

Flows with MSCs. Flows to MSCs include copies of the MARC data base on microfiche. Return information is a request for updates to the data base on hardcopy forms, specifically 1947-R, magnetic tape, hardcopy tape format or letters.

Flows with IMD.

Flows with IMD revolve around support and development for MARC, TAMMS, SAMS, WOLF and the ADVANCE projects. Other major systems supported by IMD include the Maintenance Reporting Management system, and the associated input data supplied by field units.

Flows with Army field units worldwide. Flows in from the field include: Form 2408-9, TAMMS information.

Flows with external DoD units. Information flows involving the current status of the over 1 million serial numbered items of the US Army, USAR, ANG, including tactical and combat equipment worldwide are gathered as part of the TAMMS/SAMS data base.

Information flows to the USAF at Fort Kelly concerning the Army portion of the Joint Oil Analysis Program.

Communication Mode and Destination Summaries

Division overview. The division communications are roughly divided into two classes; those that are concerned with data input to the automated data processing systems, and those that are not. The communications that are in the former category are usually machine readable or are of a format that can be easily readied for key data entry. The reporting component is also clearly defined, and consists of written reports sent to the recipient agencies.

Division Chief, Gayle Rees. Significant communications with commander and deputy. Most of this communication is verbal. Verbal communication also takes place with RMD, MD, and IMD. There is frequent verbal contact to the section chiefs.

Army Oil Analysis Branch, Cyril Brown, Chief. Communications include the production of written bulletins directed to field units, Maintenance officers, and Installation and Division Monitors concerning problems addressed by action officers. Written directives to laboratories are originated here. Verbal and telephone communications also take place within the working group and from the field laboratories. At present there is no electronic mail system.

Maintenance Doctrine Branch, Ed Gailear, MARC, POC. Verbal and telephone conversations with IMD Systems Design and Programming Branch are frequent. Written communications to and from MSCs and machine readable data transmittals (Usually magnetic tape) from the MSCs are received on a daily basis. Travel to MSCs occurs frequently for personal conversation and audits. The specific frequency of the travel and the duration of the trips was not indicated.

Maintenance Systems Branch. Paul Powell, SAMS Section Chief and Acting Maintenance Systems Chief; Roy Beattys, Supervisory Maintenance Management Specialist; Joe Other, Management Specialist.

A large volume of written communications, either on DA Form 2408-9 or in machine readable format provide information for the TAMMS data base. Much telephone follow up with the originators of the written documents takes place. Weekly and monthly input from the field data reduction centers provides input data to the TAMMS system.

Technical Publications Branch, Ed Florrich, Data Group Leader. Verbal and telephone communications occur frequently with others in the branch. There is also a moderate amount of verbal communication outside the branch, within the division and the AMC. Written communication is frequent, concerning the updates to the EOPDB. Communications concerning the data base are not usually in machine readable format and must be key entered.

There is no electronic mail system in use.

Written requests for information come from AMC, TAGO and MSCs. Computer generated reports are supplied to Schools, depots, and commands.

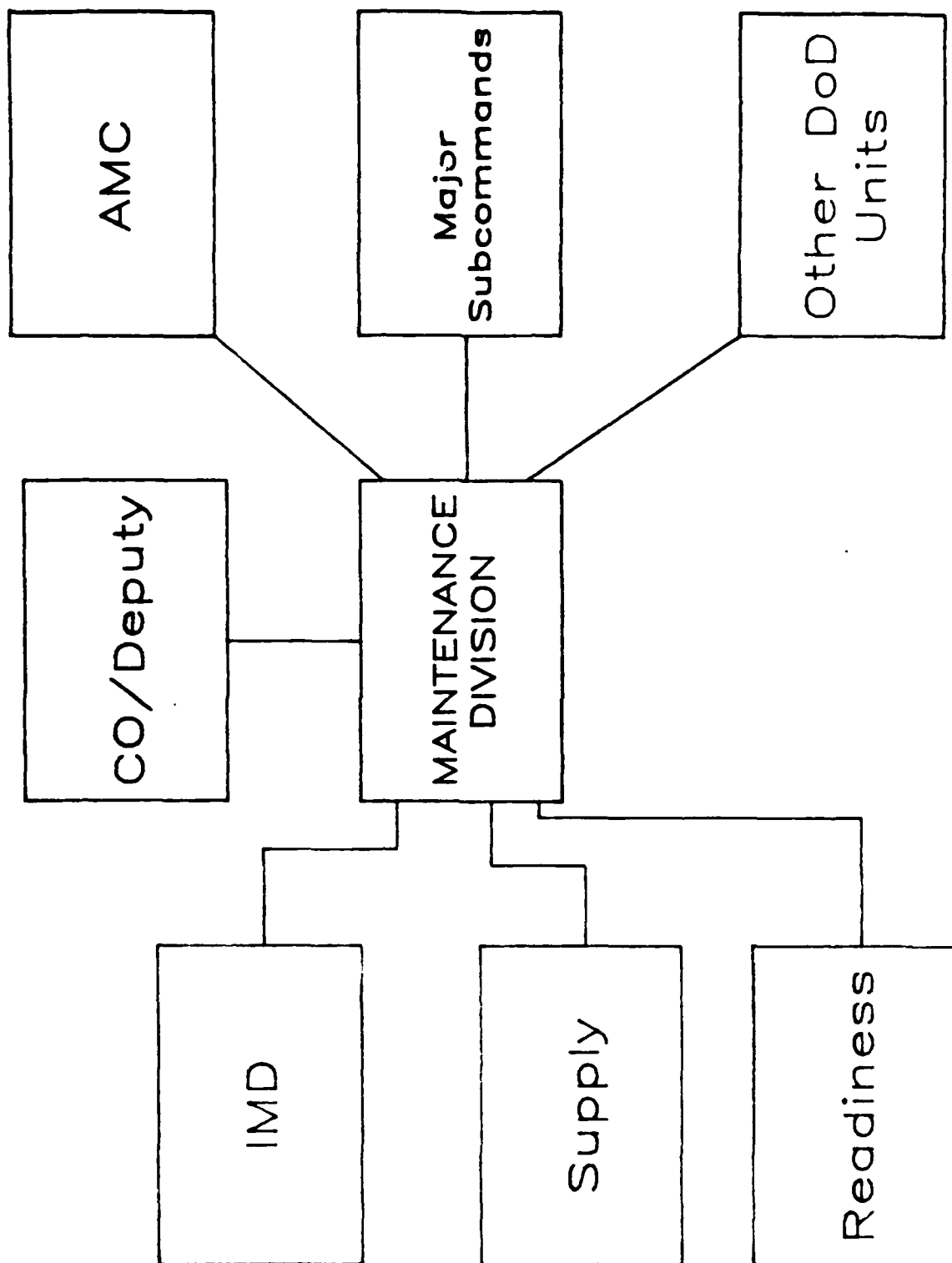
Art Rulon, Branch Chief

Verbal and telephone communications occur within the branch. Verbal, telephone, and written communications take place with IMD Systems Design and Applications, and the sections within the SD&A branch. Written directives and policy communications are shared within the branch and the division. Telephone communications from AMC and TAGO are frequently received.

PS Magazine Branch, James N. Boblenz, Managing Editor. Frequent verbal communications with staff members in the unit are the rule. Telephone communications take place with field staff researching articles. There is no indication that Mr. Boblenz travels, but by the nature of the reporting organization, there are field staff that travel extensively. There is a large flow of written communications from the staff, all of it manual.

Frequent written and telephone communications are received and originated by field mechanics or MOS personnel, the recipients of the publication.

There are no automated or electronic mail systems in this branch.



5 READINESS DIVISION

Summary of Future ADP Plans

Chief

Willard F. Stratton needs an interoffice mail facility and more graphics capability. He is planning to create a query capacity at MRSA for Centralized Deficiency Reporting (CORE) data elements. He would like to do trend analysis on this data. To keep up with work load, he is hoping to acquire PCs for every action officer. In the long run, he would like all readiness data funneled to MRSA and sees MRSA as a major databank for Quality Assurance reporting. He can foresee the need for an IBM Sierra-size main frame in Readiness to accommodate increasingly larger data bases. He would also like all data online in the future. An HP3000 is on order. This machine might be used for networking. A future project will be LOGPARS which will be a rival system to IMD's ADVANCE.

Readiness Analysis and Equipment Improvement Branch

The branch is planning expansions of the Sample Data Collection (SDC) system and the deficiency reporting system. MANPRINT is currently under development on the HP 3000 in IMD. This will require large data bases.

Integrated Logistics Support Branch

The branch is developing an optimization model for Army-wide equipment tracking to tie equipment procurement and distribution together. They are presently contracting with the University of Texas to develop the model and plan on having the Naval Research Center in Bethesda, MD continue with the project. They are trying to develop an algorithm that will accomplish this task. As an alternative, until this model and resulting system is developed, Red Max will be enhanced internally. Both Red Rat and the Logistics Readiness Rating Report (LR3) will be expanded.

The branch will soon be facing a requirement to automate the "Integrated Logistics System (ILS) lessons learned" data base. They feel IMD cannot support this due to current 98 percent capacity utilization on the system. Readiness cannot do the job currently because the HP storage is not large enough. On the second and third programs, they are looking at 800 lines of code in the data base with Army-wide hookup.

Equipment Development and Deployment Evaluation Branch

The branch's list of wants and needs includes:

- More MS-DOS based microcomputers for easier access to information.
- Electronic direct access to operational test and evaluation agency (OTEA) and Logistics Evaluative Data Base data would be a great help.
- Energraphics, dBase III, Wordstar, Lotus 1-2-3, and Crosstalk to prepare special studies.
- Slide generation equipment
- Task and Milestone tracking on large scale basis.
- Statistical package (mainframe size) to help with analysis

- Data communication capability with equipment in other divisions.
- Optical scanner to facilitate data entry.

In addition, the branch foresees some large data bases coming up in the future. These include the National Training Center Lessons Learned data base which will go on the ordered HP 3000. Finally, they note that progress is occurring on a planned communications network. While they don't have specific suggestions, they feel that it is important to work on developing an environment in which people will be more encouraged to learn about the micro computers on their own and use them.

Logistics Engineering Branch

No future plans for ADP systems were mentioned in the interviews.

Description of Automated Systems

Note: A "system" for this purpose is defined as a work process supported by automated data processing.

Chief

The division chief, Willard Stratton, functions as the high-level manager for all the systems described below. For systems that are internal to his division, he also functions as the system owner. Depending on the conditions, he may also function as a system developer or user.

Readiness Analysis and Equipment Improvement Branch

Gary Arnold, acting subsection chief of Modification Work Order/Deficiency Reporting System (MWO/DRS) in the Sample Data Collection and Equipment Improvement Section is the manager of the system. MWO/DRS storage is on the AS/5.

Input for the DRS portion of the system comes from monthly reports from AMC and other MACOMs that are consolidated into the DRS national-level data base. The data base primarily contains a combination of Equipment Improvement Recommendations (EIR) and Quality Deficiency Reports (QDR) and is online to AMC. It is processed daily on the AS/5 to produce reports of transportation discrepancies and other discrepancies, summaries, and inquiry replies. It can store only 3 years of data for AMC instead of the requested 5 years due to computer storage facilities.

Input for the MWO (and the Modification Work Order Record/Status [MODWORS]) portion of the system comes from the Automated Logistics Management System Action (ALMSA) in St. Louis. General inputs to the system come via autodin and hardcopy from the field world-wide. The system is processed daily on the AS/5 with data storage also on the AS/5. It has 200K records and is online to AMC and available to several other MACOMs. Outputs include the MWO Index, which is a product of MWO History as to the status of MWO Modified. This program is supported by 1.5 persons in Carl Webb's section of IMD.

Additional outputs are program status reports and summaries. MWO information is also passed to SAMS and TAMMS.

Readiness Integrated Data Base (RIDB). The manager of this system is Dick Endricks, the chief of the Readiness Analysis Section of this branch. The data base is classified, unique to MRSA, and is projected to grow significantly in the future. The system takes inputs on reportable Army equipment world-wide on form 2406 via autodine or hardcopy. The data is processed on the IMD HP 3000. Outputs include special reports transmitted electronically to AMC and other commands and a report group of "standard products" that are sent out to major units.

The Material Condition Status Report (MCSR) is produced in the RIDB system. The report outputs include: equipment historical availability trends, unit equipment status and serviceability reports, selected command unit reviews, and special products (e.g., trends and analyses). The outputs are used by DA staff, HQUSAMC, field units, USAMC MSC, USAMC LAO and MRSA. MRSA uses this information to analyze data, publish MCSR trends/summaries, and to provide online information for comparative analyses. The Readiness Analysis Section of the Branch develops proposals to enhance the scope and visibility of MCSR and to facilitate its interface with the Standard Army Maintenance System (SAMS).

Sample Data Collection (SDC). The managers of this system are Don Paolini and Dick Endricks, with Don Paolini of the Sample Data Collection and Equipment Improvement Section having primary responsibility according to Manual 10-1. The input for this system is field data, usually hardcopy. The system runs on the IMD mainframe. Several expansions are planned. The data is processed at MRSA for use by MSCs/PMs/Developers, DA staff, MACOMs, Field Units, Industry, and MRSA. At MRSA, the data is used for input into fielded system reviews/fielded system assessments, data base comparisons with MCSR, Prescribed Load List/Army Supply List (PLL/ASL) determinations, and lessons learned. This system is a rival to Maintenance Division TAERS/TAMMS.

Logistics Readiness Rating Report (LR3). The Readiness Analysis Section is the system manager and is designated the AMC proponent for the system. The data for this system are stored on tape and read into the HP 3000. The system was developed by the Logistics Evaluation Agency (LEA) in Pennsylvania and contains Red Rat, Pro Rat, Allot, and Simulation Model. The general purpose of this system is to provide the DCSLOG with a summary of readiness information, systemic problems, and areas of management influence that could correct readiness problems. LR3 is in part a subsystem of Red Fix. For the first three of these subsystems, the input is in tape format and the output is hardcopy. The output of LR3 flows into Red Max. An expansion for this system is planned.

Integrated Logistic Support Branch

Red Fix. John Dixon, acting chief of a subsection in the Force Modernization Management Section, is the system manager and principal user. The general purpose of this system is to determine what materiel is on hand versus what is authorized. The system runs on the HP 3000. MRSA has been tasked by AMC to handle Red Fix. Readiness will soon run Red Rat which is the same as Red Fix. Red Fix has four supporting systems. These are: ERC-A

(ships assets to fill shortages and track status), LR3 (determines shortages [EOH] degrading readiness), Red Max (determines maximum number of units that are fixable) and Red Tie (links shortages to PPBS [buy items that improve readiness]). The system will eventually be upgraded to the HP 3000/70.

ERC-A. This program is a task part of Red Fix. It is on the HP 3000 in room 35. Inputs come from MACOMs, via DA to MRSA. The program evaluates the ERC data base and decides whether to repair equipment or not. Output is reports in hardcopy to MACOMs, MSCs and HQAMC. ERC-A must be coordinated with the Logistics Intelligence File Data Base to validate and track wait, requisitions, and equipment.

Logistics Readiness Rating Report (LR3). John Dixon, acting chief of a subsection in the Force Modernization Management Section, is a user of this system. The system is managed by the Readiness Analysis and Equipment Improvement Branch (a more complete explanation of LR3 is found there in section 3.2.4). At this point, LR3 is utilized as an input into Red Max and Red Fix.

Red Fix Maximization (Red Max). This program is managed by the Force Modernization Management section. The program will run on the HP 3000. It was written internally by IMD. If it works, Red Max and Red Rat will run against each other to see what can be fixed. The purpose of the program, a subunit of Red Fix, is to determine the maximum number of units that are fixable. Red Max takes input from LR3 and assets for readiness for processing. The output goes in to a MRSA program called ERPS.

Readiness Rating (Red Rat). This program is the same as Red Fix. LEA was tasked to move Red Rat to MRSA. Red Rat was tested on the AS/5 and is being written by IMD. The inputs come from unit status reports, SACS, and SB 700-20. The output is the 49 Report, a continuous tracking report, which gives a listing of all C4 units. It is sent to MSCs, MACOMS, AMC, and others. This branch feels that Red Rat needs further modification in IMD. An expansion of this program is planned.

Manpower and Personnel Integration (MANPRINT). The ILS Policy and Procedures Section is the manager of this system at MRSA and the AMC agent incorporating MANPRINT DA-wide. The application is basically a tracking program of human resources. The system will receive manpower and personnel information from units DA-wide and will require a large data base. It is currently being developed with IMD programmers to run on the HP 3000.

Integrated Logistic Support (ILS). The manager of this system is the branch chief. Primary assistance in this role comes from the ILS Policy and Procedures Section. Inputs to the system come from Design Influencing Requirements (including DRS, ILS lessons learned, SAMS, and SDC), LASS, ILS dollar cost per task, CAMS, and DDS. After processing on the HP 3000, outputs include: ILSP, SD, and SOW in hardcopy. This is a relatively large system used by all MRSA divisions and many outside organizations.

ILS lessons learned, managed by ILS Policy and Procedures Section, will be automated in the future. ILS updating is done via punched cards. Readiness prepares the information, which is keypunched by Maintenance and then sent on to IMD for processing. An ILS Review and Analysis Data Base is

part of the system. It is actually the Army Management Milestone System data base.

ILS Planning and Requirement, Simplification System (LOGPARS). The managers and developers of this system are in this branch. The purpose of this system is to obtain integration for acquisition strategy, functional acquisition disciplines, and ILS costs for preparation of individual developmental hardware system specifications. The system is currently in the development stage.

ILS Milestone System. This system receives input information from MSC ILS offices. The information is processed in MRSA. System outputs include: ILS Milestone Schedules, ILS Scheduled Events, ILS MS Variance, Theater Materiel Fielding, ILS Review and Analysis, and POC Listing for Acquisition Systems. 600 Milestones are tracked on the AS/5 for this system. The system was imposed by AMC.

Army Management Milestone System (AMMS) on IMD AS/5. Sherry Rowe of the Force Modernization Management Section is the system manager. The system is supported by the Supply and Equipment Support Section of IMD. Lewis Hart is the action officer in IMD responsible. The data base used by this system is also used by ILS Review and Analysis Data Base.

Equipment Development and Deployment Evaluation Branch

James Folk, branch chief, and Bob Wade, office equipment POC, are users of the Mini Tab statistical data analysis system which is a proprietary software package. System inputs are available internally for the project concerned. The package can operate in either batch or interactive modes providing descriptive statistics and regression analysis. The output is the requested statistical analysis.

ILS. The people in this branch are considered system input sources and end users. They submit quarterly reports to the ILS system based on field and branch-internal information.

National Training Center (NTC) Lessons Learned Data Base. This system is in the planning stages. In development, branch staff will be incorporating this data into the Broader Lessons Learned data base already at MRSA. The input for the MRSA data base will come from the NTC in California. Output from this data base at MRSA will be merged with the Larger Lessons Learned data base and then flow into other MRSA programs. Eventually, this data will be on the HP 6800.

Test Evaluation Command Data. Bob Wade is a user of this system. This information originates at Aberdeen Proving Grounds where it is entered into an HP. The input comes to Bob Wade at MRSA in hardcopy. This creates a long time delay which is seen as a "huge problem." The data are used at MRSA to monitor the status of field equipment.

Logistics Engineering Branch

This branch serves as the DOD Logistic Support Analysis (LSA) Support Activity and hence is the manager of this system at MRSA and the system's

coordinator DA-wide. The general purpose of the system is to provide standardized information Army-wide on repair time, parts, training, test equipment, tools, facilities, and failure rates with respect to Army equipment maintenance. Inputs to the system are maintenance issues submitted from world-wide units via autodin or hardcopy. The LSAR system processes the information on IMD's AS/5. Outputs of the system include: specifications, changes, and statistics.

This system is supported by five programmers from Lewis Connelly's group in IMD. This is Connelly's largest single application project. LSAR is, in part, a contractor project. LSAR is distributed to 654 users and must adapt to any users requirements. The system consists of 162 programs with 165,000 lines of code.

This branch is also the manager for the HP 3000 computer system.

Data Description

Readiness Analysis and Equipment Improvement Branch

Modification Work Order/Deficiency Reporting System (MWO/DRS). Input for the DRS portion of the system comes from monthly reports from AMC and other MACOMs that are consolidated into the DRS national-level data base. These data are primarily a combination of Equipment Improvement Recommendations (EIR) and Quality Deficiency Reports (QDR).

Input for the MWO (and the Modification Work Order Record/Status [MODWORS]) portion of the system comes from the Automated Logistics Management System Action (ALMSA) in St. Louis. General inputs to the system come via autodin and hardcopy from the field world-wide.

Readiness Integrated Data Base (RIDB). The data base is classified and unique to MRSA. The system takes inputs on reportable army equipment world-wide on form 2406 via autodin or hardcopy.

Sample Data Collection (SDC). The input for this system is field data, usually on hardcopy.

Logistics Readiness Rating Report (LR3). The input data for this system are stored on tape and read into HP 3000 for analysis.

Integrated Logistic Support Branch

Red Fix. Inputs come from its subsystems: LR3, Red Max, ERC-A, and Red Tie.

ERC-A. This program is a task part of Red Fix. Inputs come from MACOMs, via DA to MRSA.

Logistics Readiness Rating Report (LR3). In this branch, LR3 is used only as an input to Red Fix. No new inputs are added to LR3.

Red Fix Maximization (Red Max). Red Max takes input from LR3 and Assets for Readiness.

Readiness Rating (Red Rat). This program is the same as Red Fix. The inputs come from unit status reports, SACS, and SB 700-20.

Manpower and Personnel Integration (MANPRINT). The system will receive manpower and personnel information from units DA-wide. Note that this system is in the development stage.

Integrated Logistic Support (ILS). Inputs to the system come from Design Influencing Requirements (including DRS, ILS lessons learned, SAMS, and SDC), LASS, ILS dollar cost per task, CAMS, and DDS.

ILS Planning and Requirement, Simplification System (LOGPARS). The system is currently in the development stage. No specific information input plans were offered in the interviews or was found in the available documentation.

ILS Milestone System. This system receives input information from MSC ILS offices.

Army Management Milestone System (AMMS) on IMD AS/5. The data base used by this system is also used by ILS Review and Analysis Data Base. No specific information was offered in the interviews or found in the available documentation.

Equipment Development and Deployment Evaluation Branch

Mini Tab Statistical Package on HP 3000. Inputs are available internally for the project concerned.

ILS. Input is sent from this branch to ILS in the form of quarterly reports based on field and branch-internal information.

National Training Center Lessons Learned Data Base. The input for the MRSA data base will come from the NTC in California.

Test Evaluation Command Data. Currently, this information enters MRSA via hardcopy sent from Aberdeen Proving Grounds.

Logistics Engineering Branch

Logistic Support Analysis (LSA). Inputs to the system are maintenance issues submitted from world-wide units via autodin or hardcopy.

Information and Data Sources and Their Relationships

The key points to make here are the following:

- 1) RD does have data files on the HP 3000 and the AS/5 which it can be considered the owner of. However, no information on the data base structure was made available.

- 2) Additionally, the potential for redundant data proliferation on the micros should be considered. Due to the early stages of introduction of these micros, interviews indicate that there is no significant issue in this area at the present time. Exceptions to this include the use of incompatible word processors and the possible updating of data sets on micros that would not be posted to the HP 3000 or IMD's AS/5. This might compromise the integrity of the data in the future.

Organizational Information

Proponent and Significant Functional Differences Within MRSA Organization

As summarized from the Organizations and Functions Manual, the key functions of RD are to evaluate and report on all factors affecting materiel fielded or to be fielded to assure that the materiel meets user requirements and is logistically supportable through its life cycle; to assure that the principles of integrated logistic support (ILS) planning are followed in developing and fielding new weapon systems and equipment; and, to report on and evaluate Army materiel readiness. This includes supporting the MWO/DRS, SDC, RIDB, LR3, Red Fix, Red Rat, MANPRINT, LOGPARS, ILS, Milestone, LSA/LSAR, and other automated systems.

In function, Readiness has a fairly high volume of external-MRSA communications owing to its world wide support mission. Of this communication, most all of external-MRSA flows are via autodin or hardcopy. Internal-MRSA flows are mainly in verbal form either in person or by telephone. There were no self-identified role differences offered in the RD interviews.

Notes:

- 1) Those people identified below include only interviewees and persons directly referred to by interviewees. They also include persons noted in supporting documentation.
- 2) The HP 3000 hardware system is managed by the Logistics Engineering Branch although much of the data and programs have different functional centers of control within Readiness.
- 3) The division chief, Willard Stratton, functions as the high-level manager for all the systems described below. For systems that are internal to his division, he also functions as the system owner. Depending on the conditions, he may also function as a system developer or user.

Readiness Analysis and Equipment Improvement Branch

Modification Work Order/Deficiency Reporting System (MWO/DRS). Gary Arnold, acting subsection chief of MWO/DRS in the Sample Data Collection and Equipment Improvement Section is the manager of the system. Ande Bodray is the primary contact for the DRS portion of the system. The system is supported by 1.5 persons in Carl Webb's section of IMD.

Readiness Integrated Data Base (RIDB). The manager of this system is Dick Endricks, the chief of the Readiness Analysis Section of this Branch. The primary contact for the system is Don Baily.

Sample Data Collection (SDC). The manager of this system is Donald Paolini of the Sample Data Collection and Equipment Improvement Section.

Logistics Readiness Rating Report (LR3). The Readiness Analysis Section is the manager for this system and is designated the AMC proponent for the system according to Manual 10-1. John Dixon, in the Force Modernization Management Section of the ILS Branch is the primary contact.

Integrated Logistic Support Branch

Red Fix. John Dixon, acting chief of a subsection in the Force Modernization Management Section, is the system manager and principle user. The system is maintained in part by IMD.

ERC-A. This system is managed by and used internally by the Readiness Analysis and Equipment Improvement Branch as a part of Red Fix. The ILS Branch also plays a managerial and user role as the manager of Red Fix.

Logistics Readiness Rating Report (LR3). John Dixon, acting chief of a subsection in the Force Modernization Management Section, is a user of this system. The system is managed by the Readiness Analysis and Equipment Improvement Branch (a more complete explanation of LR3 is found there).

Red Fix Maximization (Red Max). This program is managed by the Force Modernization Management section. It was written internally by IMD.

Readiness Rating (Red Rat). This program is the same as Red Fix. LEA was tasked to move Red Rat to MRSA. Red Rat was tested on the AS/5 and is being written by IMD.

Manpower and Personnel Integration (MANPRINT). The ILS Policy and Procedures Section is the manager of this system at MRSA and the AMC agent incorporating MANPRINT DA-wide. Janice Elwood is the primary contact. The system is currently in the development stage.

Integrated Logistic Support (ILS). The manager of this system is the branch chief. Primary assistance in this role comes from the ILS Policy and Procedures Section. This is a relatively large system used by all MRSA divisions and many outside organizations.

ILS lessons learned, managed by ILS Policy and Procedures Section, will be automated in the future. Readiness prepares the information, which is keypunched by Maintenance and then sent on to IMD for processing.

ILS Planning and Requirement, Simplification System (LOGPARS). The managers and developers of this system are in this branch. Jay Graver in the Force Modernization Management Section is the primary contact. The system is currently in the development stage.

ILS Milestone System. This system is primarily managed and used by the Integrated Logistic Support Branch.

Army Management Milestone System (AMMS) on IMD AS/5. Sherry Rowe of the Force Modernization Management Section is the system manager.

Equipment Development and Deployment Evaluation Branch

Mini Tab Statistical Package on HP 3000. James Folk, branch chief, and Bob Wade, office equipment POC are users of this data analysis system which is a proprietary software package.

ILS. People in this branch are considered system input sources and end users.

National Training Center (NTC) Lessons Learned Data Base. People in this branch are the developers and potential users. The location of the manager of the data will be determined later.

Test Evaluation Command Data. Bob Wade is a primary user of this system.

Logistics Engineering Branch

Logistic Support Analysis (LSA). This branch serves as the DOD Logistic Support Analysis (LSA) Support Activity, hence it is the system manager. John Peer is the branch chief. The branch is also the coordinator of this system DA-wide. This system is supported by five programmers from Lewis Connelly's group in IMD and, in part, by contractors. LSAR is distributed to 654 users.

HP 3000 hardware system. The Engineering Analysis Section of this branch is the manager for the HP 3000 computer system. Jerry Muszik is the primary contact.

Flow Diagrams and Descriptions

RD contacts with IMD

With some exceptions, the following lists contacts between RD and IMD that are beyond the normal communication between the two divisions for administration purposes. This has been done to better focus on the issue of systems unique to the RD-IMD relationship.

Chief. The chief meets weekly with IMD chief in a MRSA-wide division chiefs meeting with CO. He directs the Sample Data Collection (SDC) system which runs on the IMD mainframe and coordinates the system with IMD. He would like to get more support from IMD on software maintenance and hardware purchases. Currently he must go outside of MRSA for this assistance.

Analysis and Equipment Improvement Branch. The overall function of designing, developing, implementing, reporting, and managing Army equipment reporting systems is coordinated closely with IMD, where the machines that run their programs and store their data are located. They are working with IMD programmers in developing the MANPRINT system that will go on the HP 3000.

They would like more contact with IMD in selecting and purchasing equipment to meet their needs. They have daily interaction with IMD regarding the Deficiency Reporting System (DRS), Jacqueline Byrd of the Supply and Equipment Support Section, and Modified Work Order (MWO) system, Lois Newman of the same

IMD section, that are on the AS5/3. The Readiness Integrated Data Base (RIDB) that is the focus of much of their work in also on the IMD HP 3000 and provides a need for communication. The branch is supported by 1.5 programmers in Carl Webb's section of IMD.

Integrated Logistics Support Branch. From the interview, a few comments should be noted at this point to present a complete picture of communication that does occur and communication that is desired. John Dixon likes not having to go through IMD channels to get a change, so he likes having data stored on the HP. Ribble commented that there is not much system support from IMD to functional users which is why the branch went with the HP. Ribble wonders what IMD sees as their objective in providing functional user support.

On the IMD AS/5 mainframe, this branch maintains the Army Management Milestone System data base. Sherry Rowe is the manager of the system in this branch. IMD support for the system comes through the Supply and Equipment Support Section where Lewis Hart is the contact person. The Red Fix system runs on the HP and is maintained partially by IMD. The LR3 data base is stored on tape on the IMD mainframe and downloaded to the HP as needed. RD has talked with IMD to try to get a plot of the milestone schedule on the IMD plotter "for years" with no success. Request for changes go to Cernek, IMD chief.

IMD requires a 2-week course on Wordstar. However, people in this branch usually train themselves with the manual.

Queries arose as to when IMD last upgraded their equipment, how IMD is currently upgrading, whether IMD is using new or salvaged equipment and what should IMD be upgrading to. It was noted that IMD uses punched cards to print when in a hurry. The general feeling is that Readiness should not have to do their own ADP work. Currently RD designs their own reports and does their own development and maintenance work.

The ILS system is still on punched cards for updating the data file. Maintenance Division does the actual keypunching with the tape going on to IMD for processing.

They are also working with IMD on the installation of Red Rat on MRSA's AS/5. Red Max is under development by IMD at this time.

Equipment Development and Deployment Evaluation Branch. While the interviews imply that this branch talks with IMD on some matters such as the new HP 3000 system, no specific communication paths were offered.

Logistics Engineering Branch. The branch talks with IMD regarding the ILS and LSAR systems on the AS/5. LSAR is being supported by Lewis Connelly's programming section in IMD. Eileen Endricks is the primary contact. MANPRINT is under development by IMD programmers.

Note: Most of these communications channels, with the exception of formal microcomputer training and basic support on RD programs and data on the AS/5, have developed and are maintained on a very informal and casual basis.

Readiness Division

Flows with the Department of the Army. Flows to DA include MCSR and SDC reports. Flows from DA include collected ERC-A input.

Flows with AMC. Flows to AMC include: SDC, MWO, RIDB, and MCSR outputs and reports. Flows from AMC are primarily DRS information.

Flows with Army field units worldwide. Flows in from the include: Form 2406, SDC information, units status reports, MWO's DIR's QDR's, SALS, SB-700-20's, manpower and personnel information, and ILS and LSA input. Flows out to the field include MCSR and LSA reports.

LSAR Development Contractor. Flows here are between the contractor and the Logistics Engineering Branch on the development of the LSAR system.

Flows with Aberdeen Proving Grounds. This is primarily an inward flow of test evaluation data.

Flows with National Training Center. This is primarily an inward flow of lessons learned data.

Flows with ALMSA. This is primarily an inward flow of MWO information.

Flows with IMD. Flows with IMD revolve around support and development for RIDB, MWO/DRS, SDC, LR3, MANPRINT, ILS, ILS, LSAR, Red Rat, Red Fix, and AMMS. It also includes some micro computer training.

Flows with MSCs. Flows to MSCs include MCSR and SDC information. Flows from MSCs are primarily milestone reports.

Flows with MACOMs. The flow from AMC is primarily DRS information. The flow to AMC includes: RIDB, MCSR, and SDC reports.

Communication Mode and Destination Summaries

While it is difficult to discern the heaviest volume communications channels on a branch by branch basis due to the problems noted elsewhere in the report, some rough inferences can be made if the information is aggregated to the division level. The highest level of communication seems to occur with Army field units world-wide. A second level of communication volume occurs with AMC and IMD. A third order of communications volume takes place with all other destinations/sources listed on the information flow diagram.

Division Chief, Willard Stratton. Most communication is verbal to commander and deputy, this is followed in order by verbal communication to MD, RMD, IMD, SD. Most of the verbal contact is in person, followed by phone contact. Written communication occurs least often. He also communicated four times daily with each branch chief. This is most often done in person.

Readiness Analysis and Equipment Improvement Branch. Most of John Bodnar's phone communication is with other divisions and units outside of MRSA. Most of his written communication is used within his division and branch.

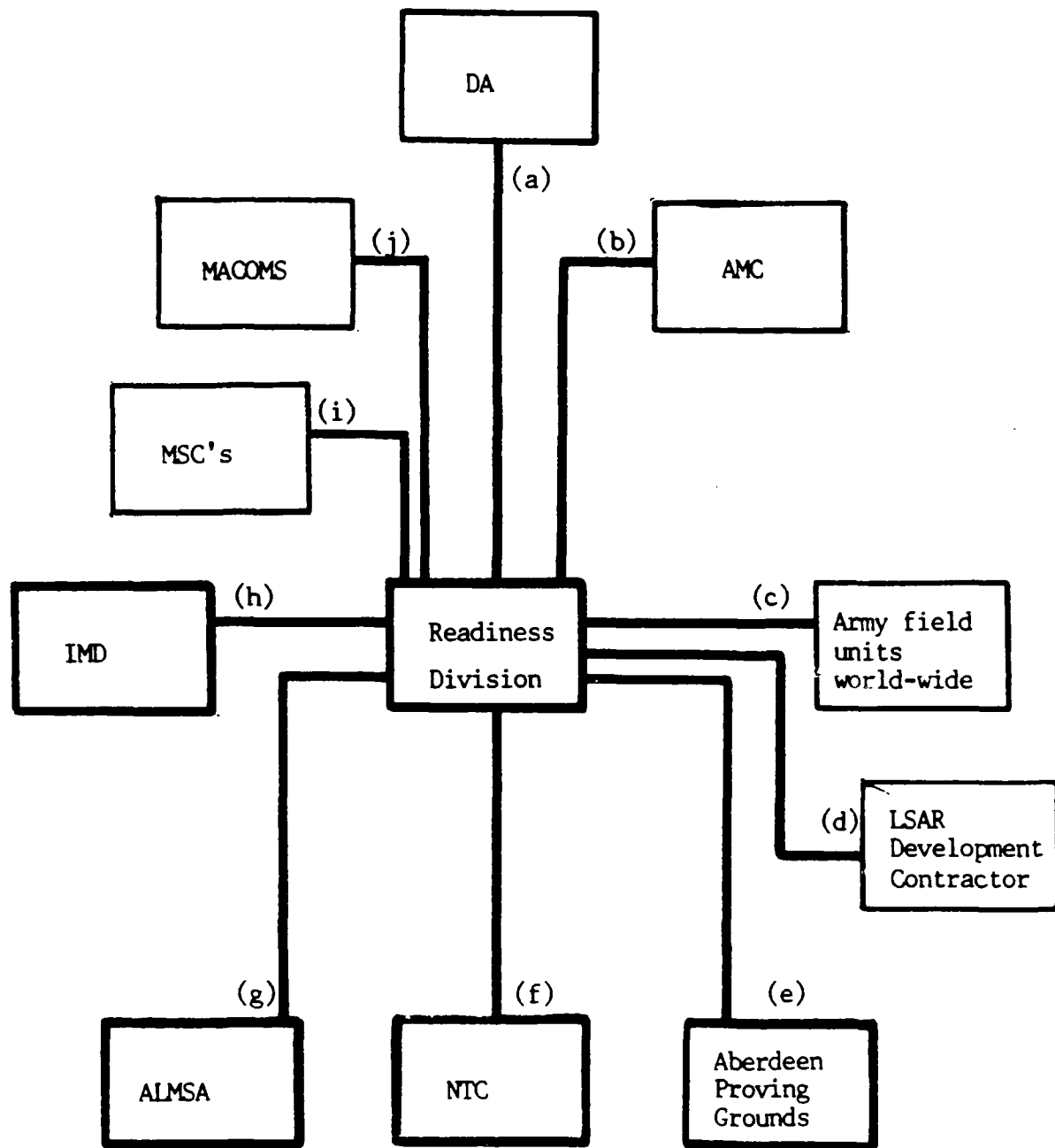
Integrated Logistics Support Branch. Most of John Dixon's phone conversation is out of his division and MRSA. Half of his time is spent with written communication. Most of this (35 percent) goes out of MRSA.

Equipment Development and Deployment Branch. Most of Folk's & Wade's communication is outside of RD/MRSA. Most all of the communication is verbal (phone or personal).

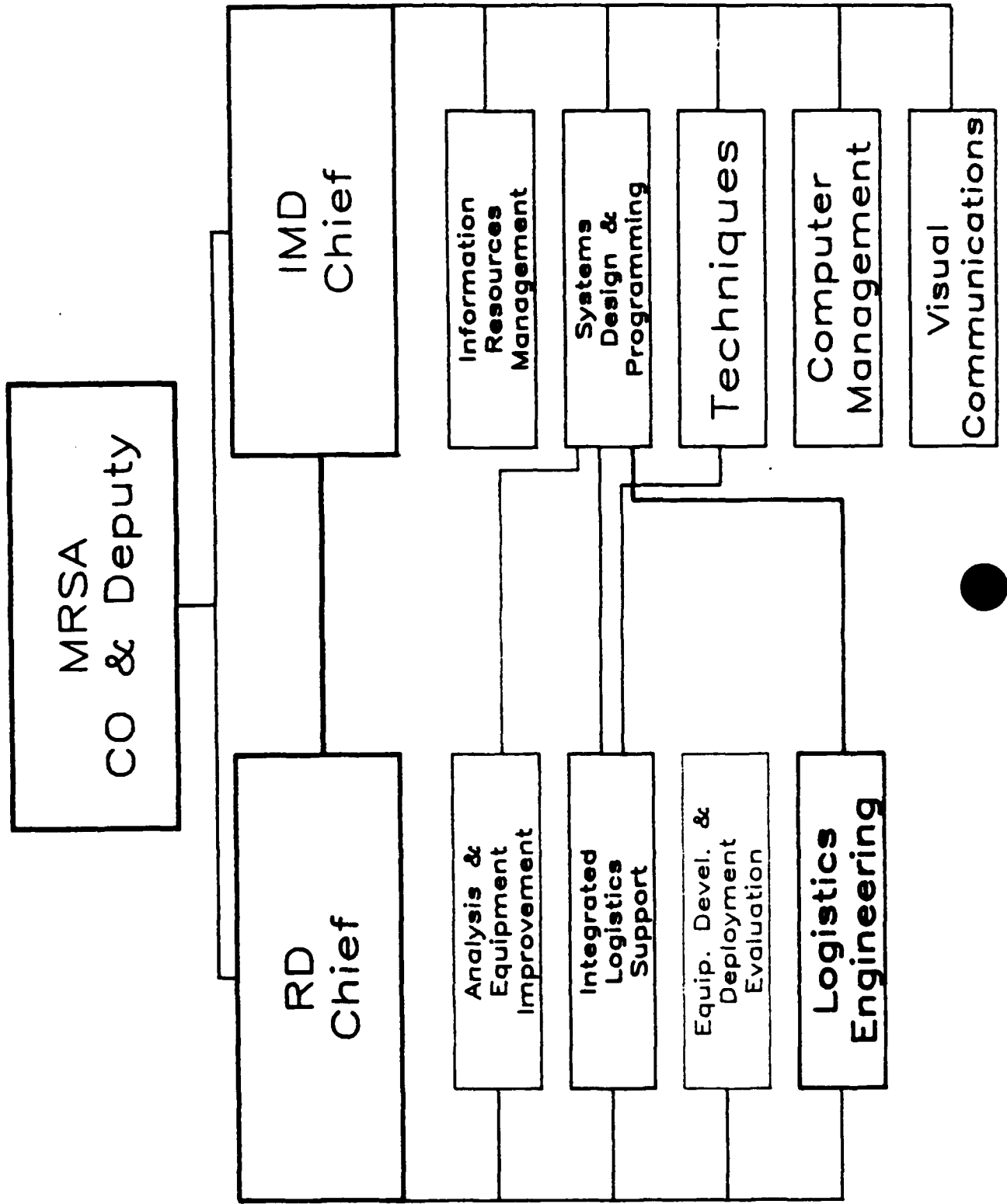
Logistics Engineering Branch. No information was offered in the interview on modes and destinations of communication.

RD Information Flow Diagram

(Relative volume noted on attached sheet)



RD - IMD Communications Chart



6 SUPPLY DIVISION

Summary of Future ADP Plans

This response has been prepared by including all future plans indicated in the interviews. Qualifications on the degree of finalization in these plans have been included as quoted from the individuals interviewed.

Division Chief

H. C. Jeffries plans on acquiring additional Wyse PCs and software for office automation.

Supply Evaluation Branch

Members of this branch would like on-line updating and query for their data on the mainframe. On the microcomputers, they would like word processing software that is more user friendly. An on-line link with DESCOM in Chambersburg, VA may also be needed.

Supply Systems Branch

Clarence Elkins needs terminals for each action officer in his branch and a data communications link to AMC. Additional training is also needed on current equipment. More Wyse PCs are also needed in the Logistics Policy and Procedures Section.

MILSYSTEMS Branch

These people would like on-line access to the UPDATE data base. A query system may also be needed. They see a need to have more equipment for word processing. They feel that the software for word processing should be more user friendly. To speed their work, they would like to have all regulations and proposals on a computer. Changes to the Information Conversion booklet would also be helpful. The key need here is really greater access to a computer. Currently much work must be done manually due to lack of time available on the existing computers. Because this work is sequential in process, automation is seen as a significant potential improvement.

Description of Automated Systems

Note: A "system" for this purpose is defined as a work process supported by automated data processing. The systems have been identified by interviews and supporting documentation noting automated support of work activities.

Supply Systems Branch

The only identified automation in the Systems and Operations Section is the general office automation system. This hardware and software is managed by Bob Gilliland. The Logistics Policies and Procedures Section uses a computer to do their regulation evaluations. Correspondence relating to the regulation evaluation project and Significant Action Reports are also done on

a computer. The section uses Wordstar on the Wyse PCs for general clerical work. A policy of this section is to try to keep everything automated.

Supply Evaluation Branch

The Systems Evaluation Section was not interviewed. However, from other documents supplied, they seem to be using two automated systems. These are the Central Demand Data Base (CDDDB) and the Support List Allowance Card (SLAC). The action officer in the section for both of these systems is George Campbell.

The Equipment Support Section uses several automated systems. These are: Support List Allowance Master (SLAM), PLL/ASL, Army Regulations records, and general office automation. The point of contact for the PLL/ASL is Dave Jenkinson. The PLL/ASL entails working with 6 to 7 types of reports that total about 1300 to 1500 reports per year. SLAM is a consolidated data base for development of recommended PLL's/ASL's, reverse SLAC, and end item application information. The Army Regulation data records are edited and updated manually by the section. They are then sent to Maintenance Division for keypunching. There are approximately 1,000,000 files for the ARs on the AS/5. However, these are kept on hardcopy for working purposes due to lack of computer access. For general office automation, they are using Wordstar on the Wyse PC. However, they would like other word processing software as they have not been impressed with Wordstar.

The Combat Operations Section seems to be using three automated systems. These are: mandatory parts list (MPL), computed MPL files (MATRIX), and the Combat PLL.

This section serves as the focal point for all contingency MPL generation within MRSA. Their function is to establish pertinent data for MPL development and coordinate with IMD to maintain accurate automated files. They are also charged with developing procedures for rapid MPL file inquiry to aid mobilization efforts. The section's role in MATRIX is an extension of MPL. Here they are directed to maintain accurate, computed MPL files in the form of MATRIX.

Finally, this section is responsible for the Combat PLL. This system is supported by IMD along with the PLL/ASL. The action officer for Combat PLL in this section is Marcia Byrnes.

MILSYSTEMS Branch

The automation in this branch is currently limited to a Wyse PC with Wordstar and an information conversion process done through a contractor. However, the people in this branch come into contact with other automated systems that they would like to be connected to. These systems include on-line Army Regulations and a data base called UPDATE.

Data Description

Supply Systems Branch

Input for the regulation projects done in the Logistics Policy and Procedures Section comes in hardcopy from AMC. The officer responsible in the section has 30, 60, or 90 days, depending on the project, to respond with a final report after gathering other information and evaluating the proposal. Additional information comes from the logistics center, DELSI (Ft. Lee), depots, or MRSA divisions. The output is the final report in hardcopy.

Supply Evaluation Branch

The branch interacts with the Army Regulations records only in that they send information to the keypunching section in Maintenance Division that in turn sends them on to IMD for processing. The nature of the branch's interaction with SLAM, PLL/ASL, and systems in the Systems Evaluation and Combat Operations Sections is not known from the interviews and available documentation.

MILSYSTEMS Branch

The only data requirements for this branch's office automation system are internally defined on a job basis.

Organizational Information

Proponent and Significant Functional Differences Within MRSA Organization

As summarized from the Organizations and Functions Manual, the key functions of SD are to serve as AMC's interface between suppliers and customers to improve communications, ensure understanding, and facilitate exchange of ideas. In performing this general function, SD evaluates new regulation and procedure proposals, manages supply programs such as PLL/ASL, and works with a range of Army supply systems.

In function, Supply has a fairly high volume (over 70 percent) of external-MRSA communications owing to its world wide support mission. Of this communication, most are written memos or DFs. The exception to this general rule is in the SMART office where communication is more evenly split between verbal and written communications. Within the Division, most communication is verbal. There were no self-identified role differences offered in the SD interviews.

Notes:

- 1) Those people identified below include only interviewees and persons directly referred to by interviewees. They also include persons referred to in supporting documents.
- 2) The division chief, Harley Jeffries, functions as the high-level manager for all the systems described below. For systems that are internal to his division, he also functions as the system owner.

Supply Systems Branch

Bob Gilliland in the Systems and Operations Section is the action officer for the office automation system. Clarence Elkins, Branch chief, is a manager and user of the Army Regulation system. Eddie Harms, Action Officer in the Logistics Policy and Procedures Section, is a user of the regulation system.

Supply Evaluation Branch

Don Hines, chief of the Equipment Support Section, is a manager of the SLAM, PLL/ASL, Army Regulation, and office automation systems. Dave Jenkinson in the Equipment Support Section is the action officer on the PLL/ASL system. David Bettler is the action officer in IMD responsible for support on the SLAM, Combat PLL, and PLL/ASL systems. Linda Flynn and Michael Lainhart are users of the SLAM, PLL/ASL, office automation and Army Regulation systems. In the Systems Evaluation Section, the action officer on the Central Demand Data Base and SLAC is George Campbell.

MILSYSTEMS Branch

Barbara Watts, chief of the branch is the manager and a user of the systems in the branch.

Flow Diagrams and Descriptions

SD contacts with IMD

With some exceptions, the following lists contacts between SD and IMD that are beyond the communication between the two divisions for normal administration purposes. This has been done to better focus on the issue of systems development.

Chief. Meets weekly with IMD chief in a MRSA-wide division chiefs meeting with CO.

Supply Systems Branch. No direct project contacts with IMD were offered in the interview with the Logistics Policy and Procedures Section. The Systems and Operations Section of this branch was not interviewed directly. The chief of this branch, Clarence Elkins, noted that training on the micros is provided by IMD and that more training is needed.

Supply Evaluation Branch. The Equipment Support Section of this branch maintains and uses the Support List Master Allowance (SLAM) and the Prescribed Load List/Authorized Stock List (PLL/ASL) systems. These systems are supported by IMD's Supply and Equipment Support Section. David Bettler is the action officer in IMD for this effort. This section also maintains the regulations that they work with on a computer (most likely the AS/5).

The Combat Operations Section was not interviewed. However, from Manual 10-1 and other documents some information is known. This section is responsible for the mandatory parts list (MPL) and is charged with coordinating with IMD to maintain accurate files. This section is also responsible for the Combat PLL/ASL. Marcia Byrnes of this section coordinates with David Bettler of IMD's Supply and Equipment Support Section.

The Systems Evaluation Section was not interviewed. No additional information concerning their contact with IMD could be found in the support documents.

MILSYSTEMS Branch. No direct communication paths to IMD were noted in the interview with this branch. One note is that the branch has an outside contractor perform information conversions. There may be some contact with IMD on this topic.

Note: Most of these communications channels, with the exception of formal micro computer training and basic support on SD programs and data on the AS/5 (such as SLAM, PLL/ASL and Combat PLL/ASL), have developed and are maintained on a very informal and casual basis.

Supply Division

Flows with DOD. Information flowing up to DoD includes evaluations and revisions of proposed regulations, policies and procedures. Information flowing down includes the proposed regulations, policies, and procedures for evaluation.

Flows with AMC. Information flowing down includes proposed regulations, policies and procedures, logistic problem assignments, and policy information on evaluations and doctrines of documents. Information flowing up to AMC includes evaluations and revisions of proposed regulations, and recommendations on evaluations and doctrines of documents.

Flows with MRSA CO. Flows with the CO consist primarily of input and discussion of logistic problems. Additional flows include standard reporting.

Flows with IMD. Flows with IMD include support for systems such as SLAM, PLL/ASL, Combat PLL/ASL, MPL, and tool improvement data which are on the AS/5. Microcomputer training is also provided by IMD to SD. The division chief is also in direct contact with IMD.

Flows with RMD. Flows with RMD are limited to administrative communication between the chief of SD and people in RMD.

Flows with MD. Flows with MD are limited to sending updated and edited regulations to MD for keypunching.

Flows with Information Conversion Contractor. Flows occur between MILSYSTEMS Branch and a contractor with information for conversion and instructions going out and converted information returning.

Flows with DOD units world wide. Completed regulations flow out to these units from the MILSYSTEMS Branch.

Flows with the DELSI data base at Fort Lee. Regulation evaluation input is requested and received via this channel.

Flows with Logistics Center. Flows to the Center include requests for regulation evaluation information and recommendations on documents. Flows from the Center to SD include information on evaluations and doctrines of documents and regulation evaluation input.

Flows with other action agencies. Flows to other action agencies include requests from the SMART Office for input on logistics problems and final reports on problems. Flows from these agencies involve the requested input.

Flows with Trade Proponent Schools. Flows to the Schools are tool improvement suggestions from the SMART Office. Flows back are feedback on those suggestions.

Flows with Maintenance Board. Flows with the Maintenance Board focus around the SMART Office. Between these two groups, discussions on logistic problems from around the Army take place.

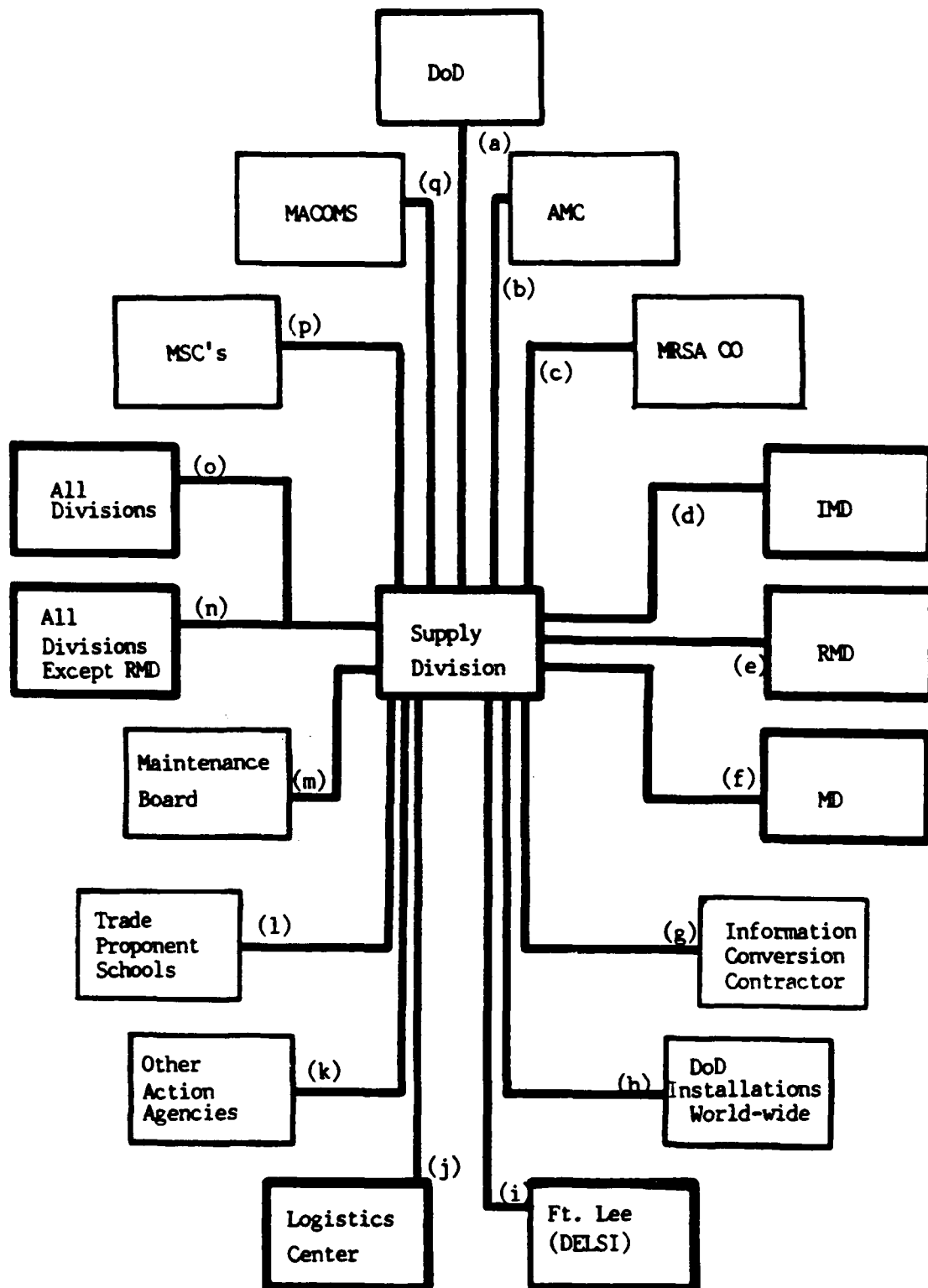
Flows with all Divisions except RMD. These flows represent an exchange of information between the SMART office and the relevant division to aid in evaluations.

Flows with all Divisions. These flows are discussions between Supply Systems Branch and relevant divisions to aid in conducting regulation evaluations.

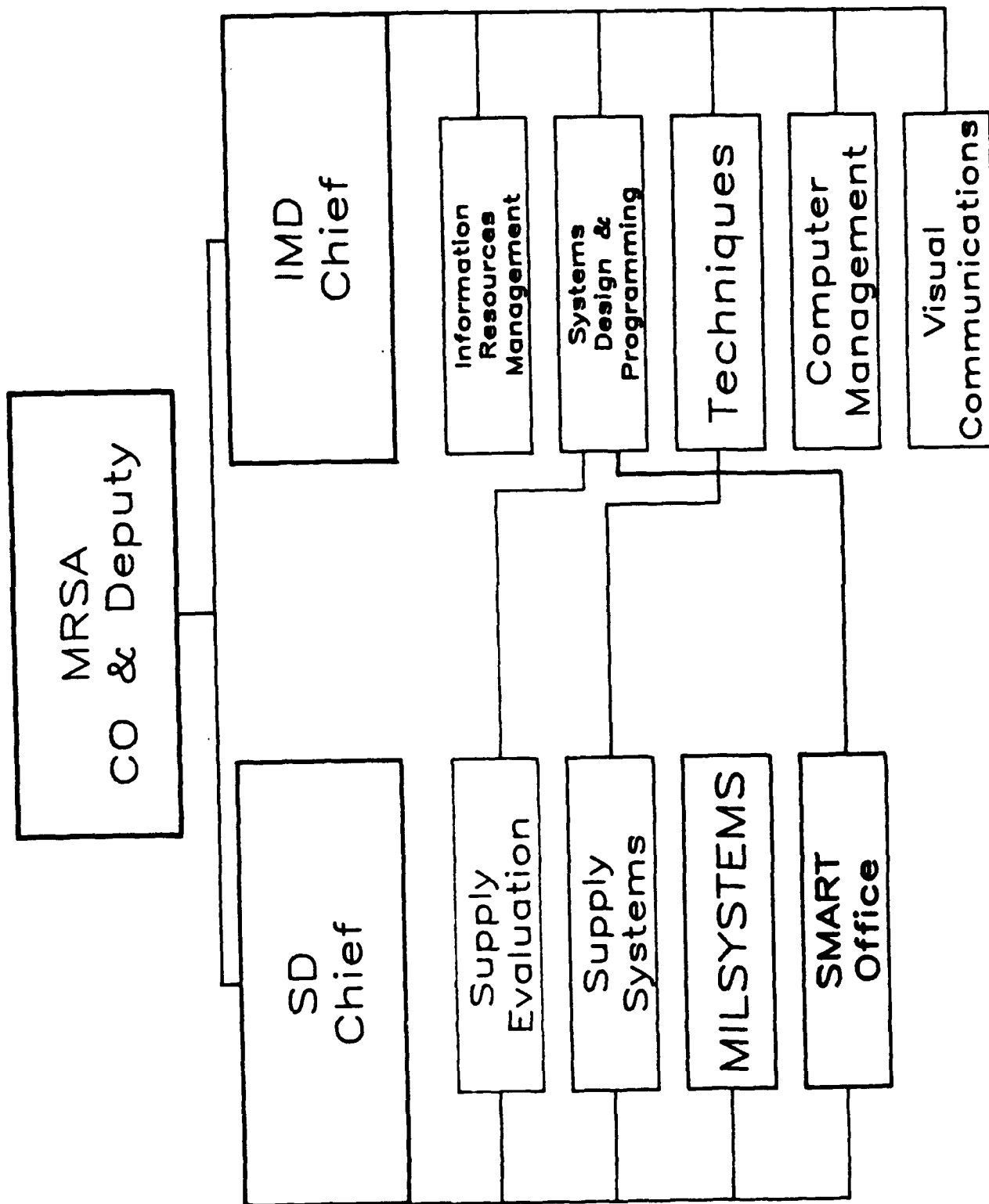
Flows with MSCs. Flows into SD include regulations for evaluation and feedback on tool improvement suggestions. Flows to the MSCs include feedback on regulations and tool improvement suggestions.

Flows with MACOMs. Flows with MACOMs consist of regulation evaluation input requests and replies.

SD Information Flow Diagram
(Relative volume shown on attached sheet)



SD -- IMD Communications Chart



DISTRIBUTION

Army Materiel Command

ATTN: Materiel Readiness Support Activity (15)

Defense Technical Information Center (2)

ATTN: DDA

17
8/88